IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication JANUARY 19, 1961

★ R. C. Mahon's New Approach To—

Automatically Fabricate Huge Assemblies p. 75

Report on Steel Labor Study p. 45

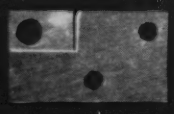
Autos: SAE Moves Toward '70 p. 50

Digest of the Week p. 2-3

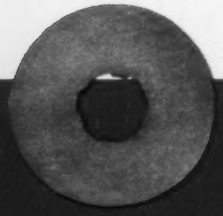
Grinds to today's

PRECISION TOLERANCES

with Gardner double spindle grinders

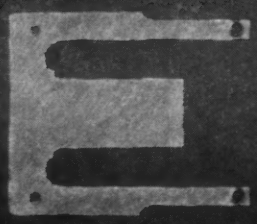


steel guide tab
stock removal: .005"—.007"
flatness: .0005"
parallelism: .0005"
uniformity: .001"



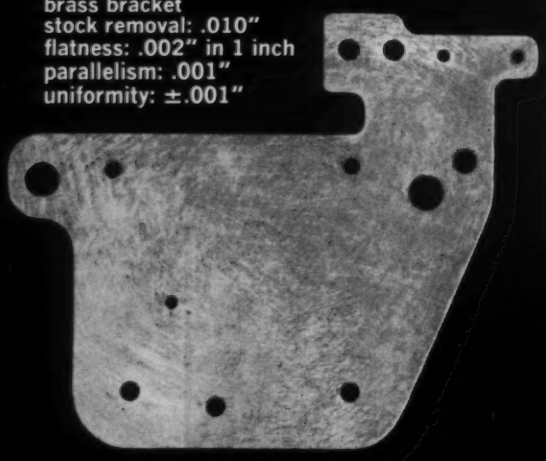
steel friction gear
stock removal: .009"
flatness: .001"
parallelism: .001"
uniformity: ±.002"

steel lever margin control
stock removal: .008"—.010" max.
flatness: .0003"
parallelism: .0003"
uniformity: .001"



steel magnet yoke
stock removal: .008"
flatness: .001"
parallelism: .001"
uniformity: ±.0009"

brass bracket
stock removal: .010"
flatness: .002" in 1 inch
parallelism: .001"
uniformity: ±.001"



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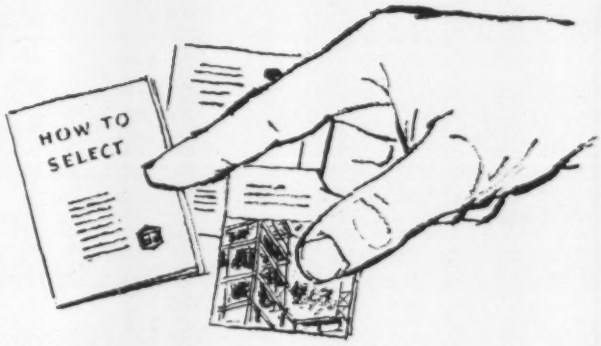

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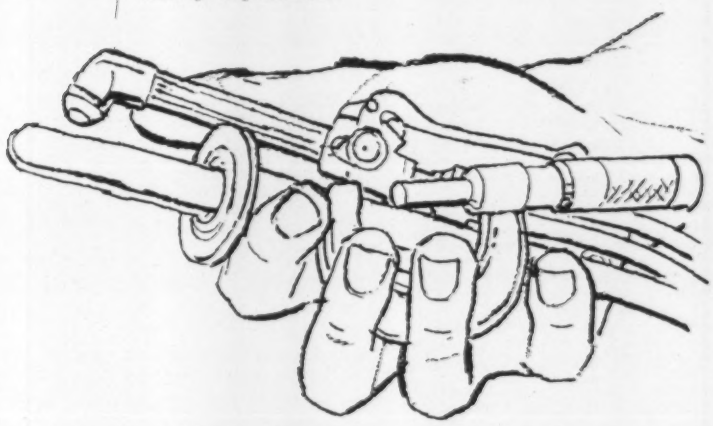

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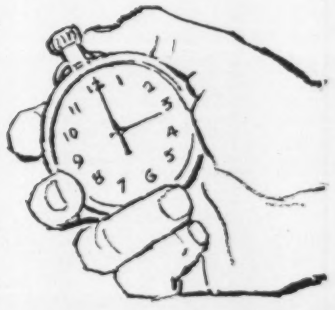

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The IRON AGE

January 19, 1961—Vol. 187, No. 3

Digest of the Week in

★Starred items are digested at right.

EDITORIAL
Government Steel Report: Bill of Rights for Industry ... 5

METALWORKING NEWSFRONT
Business Forecast ... 7
Metalworking Labor ... 9
Washington ... 11
International ... 13
Techfront ... 15
Market Planning Digest ... 43
Report to Management ... 59
Spacefront ... 73
★The IRON AGE Steel Summary ... 111

NEWS OF THE INDUSTRY
★**Special Report:** Mitchell Report Urges Government to Keep Out of Future Steel Strikes ... 45
★Changes Asked in Defense Buying ... 48
★Processors Fight Sales Tax Levy ... 49
★Automakers Preview the Future ... 50
How to Reduce Research Costs ... 51
★Gold Crisis—Kill Golden Goose? ... 52
★Are Better Days Due for Scrap? ... 53
Can Kennedy Keep Budget Balanced? ... 54
★Automotive ... 61
★West Coast ... 63
Machine Tools ... 65

ENGINEERING-PRODUCTION
★Mechanized - Handling System Automates Big Structurals ... 75
★Custom Welds Raise Axle Output ... 78
★Use Bigger Synthetic Diamonds? ... 81
★Reduce Your Punch Inventory ... 82
★New Vacuum Heat-Treat Furnace ... 84
★How to Improve Communications ... 86

MARKET AND PRICE TRENDS
★Purchasing ... 112
Iron and Steel Scrap Markets ... 116
Nonferrous Markets ... 118

REGULAR DEPARTMENTS
Letters From Readers ... 17
Fatigue Cracks ... 19
Men in Metalworking ... 67
Patent Review ... 90
Free Literature ... 93
Design Digest ... 96
New Equipment ... 102
New Books ... 108
Clearing House ... 128

INDEX TO ADVERTISERS ... 132

News of the Industry

MITCHELL REPORT

Government Stay Out—Report made for outgoing Sec. of Labor Mitchell charges probability of gov-

ernment intervention in steel strikes only prolongs and intensifies bargaining. Side effects of steel strikes, including price effects, are exaggerated, report states. P. 45

DEFENSE BUYING

Changes Asked — Industry and military leaders joined in a symposium on reliability and quality control to take a hard look at military buying. They want changes. P. 48

SALES TAX BATTLE

State vs Industry — Cold-rollers are fighting attempts by Pennsylvania tax men to levy a sales tax on many items thought exempt. State says exemptions apply only to manufacturers. P. 49

AUTOMAKING'S FUTURE

Preview of Things to Come —

Metalworking

Cover Feature

FABRICATION—In on a big advance in structural automation are W. P. Hill (left), president of the Walter P. Hill Co., W. F. Sheetz (center) and W. Willard, top executives of R. C. Mahon Co. P. 75

Recent auto engineering exposition took a look at what to expect in coming transportation. Featured were rapid transit systems, and new methods for powering of automobiles. P. 50

GOLD CRISIS

Kill the Golden Goose? — If sloppy thinking about the U. S. gold crisis is translated into action it will mean trouble for many top-notch metalworking companies. P. 52

Engineering-Production Developments

INNERSHIELD WELDING

For Mass Production—The design of a new axle-suspension system prompted automotive engineers to try a relatively new welding process. Coupled with mechanized handling, this season's fabrication technique has cut costs. P. 78

SYNTHETIC DIAMONDS

Getting Bigger—It won't be long before natural diamonds will feel the competition from synthetic stones. A carat size diamond has been developed which extends the potential for synthetic stones in metalworking. P. 81

PUNCH POINT SIZES

Too Many of Them?—In stamping, there's a condition known as high limit sizing of open tolerance holes. This condition has triggered a landslide of punch sizes. An answer is a new line. P. 82

VACUUM HEAT TREATING

A Production Tool—Researchers have reported good results with vacuum heat treating. The time has come to put a furnace on the production line. A likely candidate for this job has been built which is economical to heat, simple to control and safe to run. P. 84

COMMUNICATIONS

Setting Them Straight—A poor system of communications leads directly to confusion, overtime work and inability to define a problem. To get back on the right track, you must organize methods. P. 86

Market and Price Trends

SCRAP MEETING

Gloomy Outlook—With the market depressed, scrap men at annual convention saw little to cheer about. Best hope for long-range prosperity lies in research programs, modernization of scrap handling. P. 53

AUTOMOTIVE

GM Defends Industry—President of GM says consumer goods industries help create the wealth and taxes needed for progress. P. 61

WEST COAST

How Boeing Diversifies—Moving with the times, Farwest planemakers are diversifying at a fast pace. Boeing, for instance, has developed associated and industrial products divisions. P. 63

STEEL SUMMARY

Market Shifts—Cutbacks in automotive orders this week are weighed against an improvement in the overall steel market. Result is a tempering of early optimism. P. 111

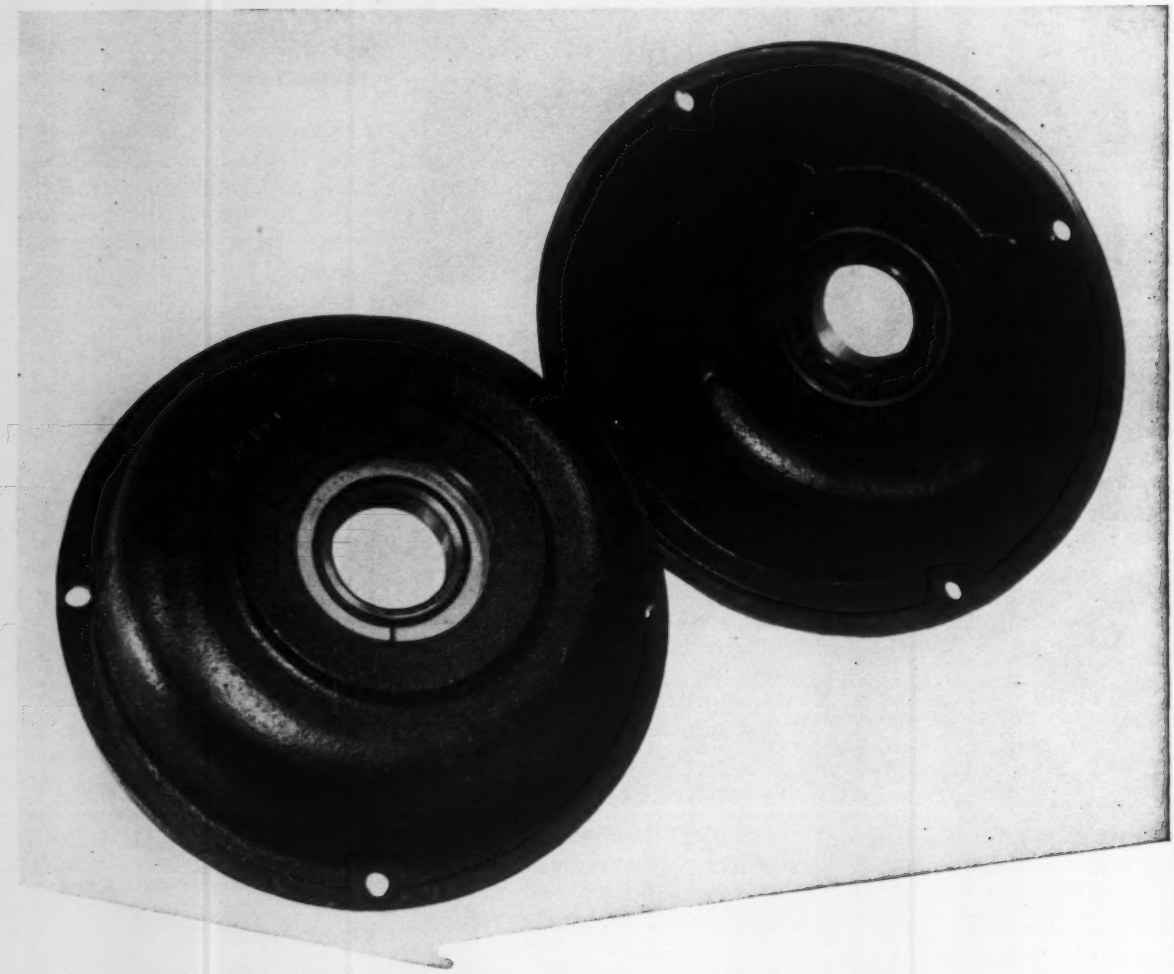
PURCHASING

More Competition—Distributors are facing increased competition from manufacturers. However, there is a trend among distributorships to specialize. P. 112

NEXT WEEK

AUTOMATIC SOLDERING

Of Printed Circuits—A new in-line unit that automatically solders the joints on printed circuit boards will be featured next week. This system realizes a big decrease in unit production costs.



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Government Steel Report: Bill of Rights for Industry

Once in a blue moon a government-sponsored report gives a break to industry. The Labor Dept.'s 316-page booklet, "Collective Bargaining in the Basic Steel Industry," does that.

It remains to be seen if Arthur J. Goldberg, outgoing Secretary of Labor Mitchell's successor, will agree with much of what is in this direct, well-written, and astounding report. (See Special Report, p. 45.)

This study, headed by Prof. Robert Livernash of Harvard's School of Business Administration, is must reading for steel officials—and union people, too. It is clear, simple, concise, objective on the whole, and quite contrary to many fondly-held, popular opinions.

The report explodes the myth that steel is a bad dragon in the economy, in the labor movement, and in the minds of the man on the street. The study bluntly indicates that past strikes have left no long-term scars on the economy.

Also, settlements in steel have had only a small effect on wages and prices in the economy. The biggest effects of steel hassles are felt by parties involved—and do not warrant national outcries and public consternation, according to the study.

This, of course, is no news to many who long have followed the steel situation. Strikes have a way of being ended. The report found out what many knew years ago: Government intervention prolongs a strike instead of causing it to end quickly.

Probably the outstanding finding — especially for a government report—is a dashing to the ground of fond beliefs on the part of some. For instance: There is no proof that steel has set wage trends for other industries or has produced a national pattern—except in steel alone.

There is no evidence that steel price increases raised the general price level significantly. The report suggests the price changes were needed because of wage increases, material price increases, and capital needs.

But the biggest and the splashiest finding is that government would do well to keep out of steel hassles. Union and industry are warned to polish up their negotiating machinery lest misguided public action—by crisis-minded politicians —result in drastic legislation. That would be harmful to labor and management.

It is good to see so many pet public and union theories blasted by an independent study.

Tom Campbell

Editor-in-Chief

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Early Signs: Both Good and Bad

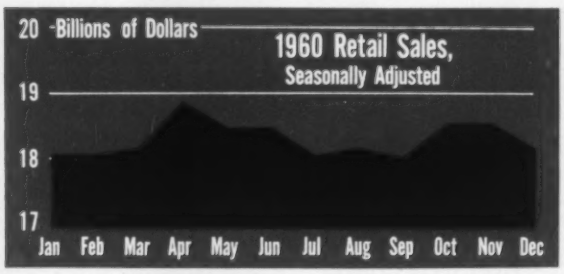
Early-year crosscurrents characterize the business picture today. Some of the indicators are discouraging; others are a little encouraging. In other cases, there's consolation in that "things were expected to be worse."

Some of the things to watch: Unemployment is at the highest level in 20 years. Retail sales declined in December, but not as much as expected, and consumer confidence remains at a relatively high level.

Early January indications are that steel orders are picking up, after a doubtful period. This is in spite of automotive cutbacks, which may hurt. But in other areas of the steel business, the outlook is definitely more cheerful. The big question now is whether unemployment will continue to mount.

Retail Sales Hold Up Well

The reportedly poor auto sales in December show up in the decline in retail sales during the month. But other than auto sales, Dept. of Commerce people note that retail activity increased during the month. The



figures (seasonally adjusted): $18.2 billion in December, down from $18.55 billion in November. As has been the case in most statistical business records, the drop is centered in durable goods. In this case, it was in autos, with other durables showing little change.

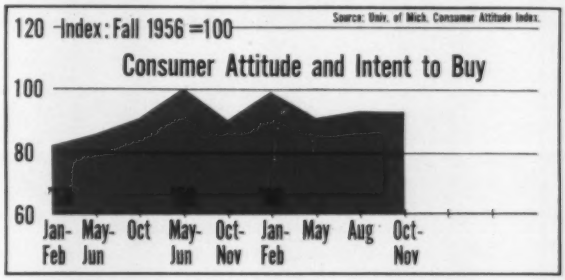
Unemployment Hits 20-Year High

The really bad business news is the high rate of unemployment. It's up sharply in December and Dept. of Labor experts note that the high December jobless total would undoubtedly be followed by a higher rate in January. This is because of seasonal factors which usually result in greater unemployment in January.

The figures: Unemployed in December, 4.5 million. This is up more than 500,000 from November and means that probably 5.5 million are out of work now. Further, the number of employed, which does not always fall or rise with unemployment, declined more than the usual drop for the month. As could be expected, factory workers are suffering the brunt of unemployment.

Buyers Haven't All Run for Cover

The Univ. of Michigan's survey of consumer attitudes and intentions to buy isn't without its critics. But it is



generally accepted as a major step in the direction of forward indications, not what happened last month. As a result, the latest conclusions bear looking into. (See Report to Management, p. 59.)

The principal conclusion: The sharp decline in the index in the first half 1960 has been arrested. This is interpreted as meaning the present recession will remain unusually mild. Another factor: Satisfaction with prices could mean a good pickup in durables.

What Freight Forecast Shows

The nation's freight handlers estimate revenue freight carloadings will be down 5.1 pct in the first quarter from the same period in 1960. But where the principal declines are expected to occur gives a good idea of what areas of business are suffering most.

Ore and concentrates are expected to be down 27 pct; iron and steel, down 31.3 pct; autos and trucks, down 16 pct. On a regional basis, the decline in rail traffic is expected to be greatest in the Atlantic states, down 19.7 pct; the Allegheny states, down 17.6 pct.

Have New Orders Hit Lowest Point?

Two important questions in the economy are: How low will the new order rate go and when will it improve?

On the basis of replies from companies surveyed by the National Industrial Conference Board, the worst is over, or nearly so. Almost three out of four of the companies whose new orders have been depressed believe the rate of incoming business will not go any lower. On improvement, one third of the firms look for a marked upturn in new orders during the first half. Some say an upturn has already taken place.

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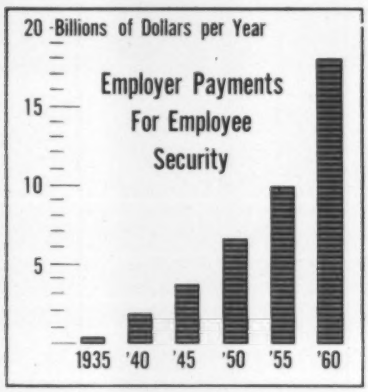

Industrial Conference Board. This was to provide employee pension, welfare, and unemployment benefits.

The 1960 total was $2.1 billion more than was paid in 1959. During the past 10 years, employer payments for employee security rose 179 pct, while total wages and salaries of employees in private industry rose 81 pct, NICB says. These fringe benefits rose from 4.9 pct of aggregate compensation in 1950 to 7.4 pct in 1960.

Old age, survivors, and disability insurance cost $5.2 billion, and unemployment insurance another $2.9 billion. Private pension and welfare funds cost $8.5 billion. The remainder was compensation for injuries.

Goldberg Names Four To Labor Posts

The top jobs in the U. S. Labor Dept., under Secretary Arthur J. Goldberg, have been split between union men and men with experience in labor relations.

Filling the four top spots are: William Wirtz, Adlai Stevenson's law partner, as Undersecretary of Labor; James J. Reynolds, a management consultant, as an Assistant Secretary; Jerry R. Holleman, president of the Texas State AFL-CIO, as an Assistant Secretary; and Mrs. Esther Peterson, legislative representative of the AFL-CIO industrial union department, as assistant to the Secretary and director of the department's women's bureau.

NLRB: Under the Gun

The National Labor Relations Board will soon be under the investigative eye of Congress. The House Labor Committee, apparently with the backing of President-elect John F. Kennedy, has decided to probe the board's policies.

The labor relations board, which umpires disputes between labor and management, has long been criticized as pro-management.

USWA: Goldberg's Firm Named Union Counsel

As predicted in The IRON AGE, the law firm of Feller, Bredhoff and Anker has been appointed counsel for the United Steelworkers of America (IA—Dec. 29, '60, p. 28).

David Feller and Elliott Bredhoff were members of the law firm of Goldberg, Feller and Bredhoff, until Arthur J. Goldberg left the firm to become Secretary of Labor in the new Administration.

UAW: Close for a Week

UAW's latest proposal to Big Three automakers involves shutdowns of auto plants periodically for a week at a time rather than mass layoffs or short work weeks.

According to the plan, if slow auto sales lead to a 20 pct cutback in auto production, the plant would shut down completely one week out of five. UAW says this would accomplish the same reduction in man hours as programming a four-day week or laying off 20 pct of the employees, yet would prove advantageous to both management and employees.

Says M. L. Denise, Ford vice president of labor relations, "Where such action is appropriate to the situation, Ford already is making use of such full week shutdowns, as it has in the past. This is particularly true in assembly plants. There are, of course, many specific situations where, because of plant functions, production requirements, or other facts, such a course isn't feasible."

Walter Reuther, UAW president, says the proposal was given as a prop to sustain purchasing power. He said thousands of auto workers face short weeks and layoffs in the weeks ahead which would seriously hurt the national economy.

He mentioned these advantages for the plan:

During full shutdown weeks, employees would get both state unemployment compensation and supplemental unemployment benefits paid by the companies. These combined benefits would yield them 65 pct of normal take-home pay for a full week.

He said the companies would benefit by avoiding costly rearrangement of jobs and manpower and retaining of workers.

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Low-slung powerful construction is the key to VERCIPOWER's inherent ruggedness. Saddle and table move directly on the machine bed of convenient fixed height—there is no movable knee. Vertical movement is provided by the spindle carrier. And consider these many other feature-advantages:

- Dual operating controls, front and rear
- Fixed table height of 39"
- Exclusive Arbor-Loc spindle nose
- Table traverse handwheel at front
- 24 spindle speeds and 32 feed rates
- Automatic Backlash Eliminator
- Dynapoise overarm for damping self-excited chatter
- Automatic table cycles—standard equipment on all sizes

VERCIPOWER is a new mighty work horse, expertly designed and equipped to handle a great variety of your milling operations. May we give you more information? Write for new catalog M-2130, or a visit by one of our field men. **Milling Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**

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★New Frontiers Face Barriers

Opposition to President-elect Kennedy's New Frontiers program is shaping up fast in Washington. There are grumblings from men on both sides of the political and economic fence.

The opposition may not stop the programs, but it will gain moderating concessions. The programs and the problems:

Area Redevelopment: Congressmen, industry spokesmen, and men like President Eisenhower's Asst. Secretary of the Treasury, Fred Scribner, are afraid the depressed area program will just rob Peter to pay Paul. They say to attract business to one area, you will only attract it away from another area.

Minimum Wage: Tough sledding is predicted for Mr. Kennedy's plan to raise the minimum wage to $1.25 and extend coverage. Democrat Sen. J. William Fulbright has joined the opposition. He urges postponement of the bill. Sen. Fulbright says he believes a higher minimum wage during the current business slump will mean higher prices, greater unemployment.

School Aid: The four-year, $10 billion school aid program recommended to Mr. Kennedy is being blasted by Republicans. They say the cost is too high. Even Democrats admit such a high priced program will face trouble in Congress, if the President-elect accepts it as his program.

Regulatory Agencies: Congressmen don't take too kindly to the idea of a White House czar over the regulatory agencies. James M. Landis, Mr. Kennedy's agency overseer, will find the going tough.

Medical Care for the Aged: Mr. Kennedy is up against solid opposition both in and out of Congress on his demand for an increase in Social Security taxes to cover medical aid to the aged. Conservative Democrats and Republicans want no manipulation of Federal tax laws.

■ Congress May Aid Small Businesses

Criticism of the government's "neglect" of small business is resounding in Congress. Legislation for tax adjustments to aid small business and a number of changes in antitrust and small business acts may be the outcome.

Criticism is based mainly around these three congressional charges:

1. The government has "neglected" small business in awarding research contracts.

2. There has been a "shocking decline" in the proportion of government procurement going to small businesses.

3. Unfair and monopolistic competitive methods applied by large corporations have "evaded censure" because of loopholes in antitrust laws or "ineffective enforcement" by government agencies.

■ Kennedy May Back Corporation Tax Cut

A cut in corporation income tax payments may yet get the backing of President-elect John F. Kennedy.

Mr. Kennedy will not back a cut in the 52 pct tax rate. But now he is thinking of a tax deduction for amounts companies invest in new plant and equipment. The tax break would be a percentage of the amount spent for increased plant and equipment each year.

The President-elect's tax advisors suggest such a write-off to spur business expansion. They believe it would stimulate business better than a faster depreciation write-off. Under this plan, industry would be given an incentive to add new plant and equipment.

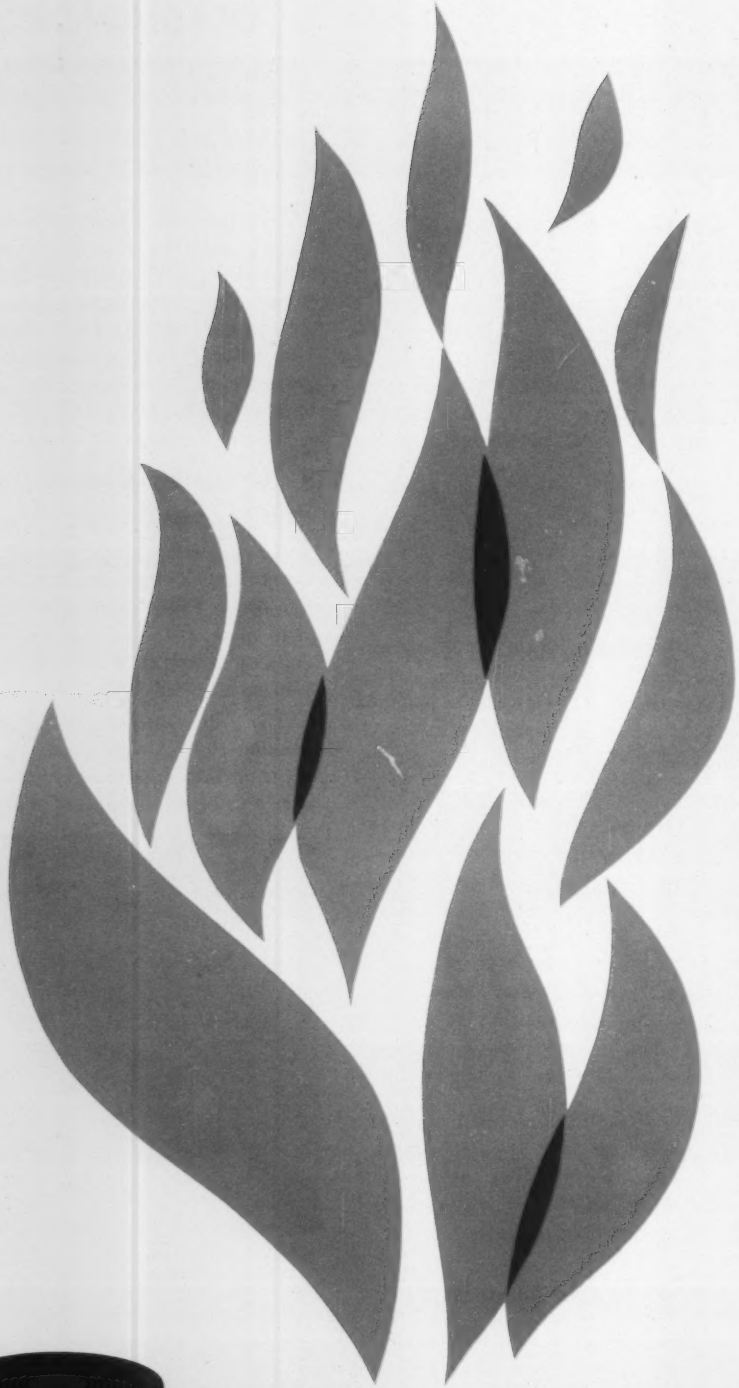
■ Kefauver Backs Pre-Merger Bill

Sen. Estes Kefauver, as usual, has introduced a pre-merger notification bill in Congress. It is the fourth year in a row that the Tennessee antitrust committee chairman has backed the legislation.

The bill, which may get more backing from Mr. Kennedy than it got from Ike, would require advance notice to Federal agencies of corporation mergers if combined assets involve more than $10 million. Advance notice would be required 60 days before transaction of the merger took place.

KEFAUVER: Kennedy's Blessing?

Sen. Kefauver says the bill would also give the Federal Trade Commission the authority to "secure preliminary court injunctions to restrain proposed mergers before their consummation or to maintain the status quo."



On October 8, 1871
when Mrs. O'Leary's
cow toppled
the lantern
Hussey had been
producing
top quality
copper
for 23 years

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COPPER RANGE COMPANY

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TO THE STANDARDS
OF AMERICAN INDUSTRY

Balance-of-Payments Solution Proposed

The president of the Air Transport Assn. of America has proposed a four-point program to improve the U. S. balance of international payments. Stuart G. Tipton made the proposal at the Dept. of Commerce's recent conference on export trade promotion.

The program recommends that:

1. The U. S., as a matter of national policy, should actively participate in the promotion of travel to this country.

2. Visa requirements should be waived wherever possible and the visa issuing practice should be simplified.

3. The government should develop and apply policies for the promotion of air freight services and simplification of export procedures.

4. National air transport policies should be revitalized to gain maximum public advantage "from a strong civil air arm."

Mr. Tipton, referring to 1959's U. S. payment deficit of $3.8 billion, points out that the travel and transportation deficit exceeded $1 billion—27 pct of the total.

Will Japan Trade With Red China?

Inside sources indicated some time ago that Japan's long-term goal is to be a big factor in supplying and trading with the Red Chinese. Now comes word from Tokyo that the liberal forces—many anti-U. S.—are demanding a new alignment with the Communist Chinese.

It is bound to come, according to long-time visitors to Japan. This, then, would downgrade the feeling in some quarters that Japan has her eye on the West Coast and other parts of the United States as goals for exceedingly large exports of steel, machinery and other durable products.

Canadian Recession: How Severe?

The business outlook in Canada just about matches the U. S. outlook. In fact, conditions are a little more rugged there.

But IRON AGE interviews suggest that plant expenditures, new mining developments, additions to ore railroads, and warehouses in the upper St. Lawrence regions will be commonplace within the next few years.

For the present, Canadians must worry their way through a "correction." Contributing to this will be a drop in iron ore exports.

Seizure Losses May Be Deductible

Companies which have lost property through seizure by Cuba's Fidel Castro may get income tax deductions on these losses.

Rep. Hale Boggs (D., La.) has introduced a bill to permit U. S. corporations and citizens to claim the property loss as a tax deduction even though it may be possible for them to recover the value by the Cuban government returning the seized property.

Boggs' bill applies both to outright owners of seized property and persons owning stock or other interest in it.

Japanese Aluminum Tariff May Rise

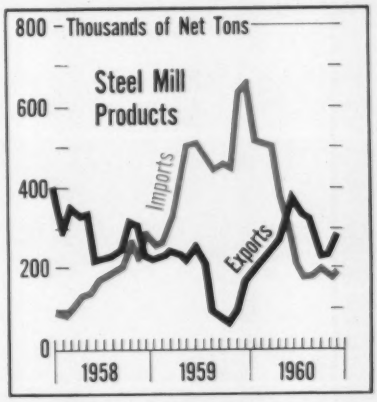
Tariff on primary aluminum entering Japan may rise 5 pct on April 1. At least that's the recommendation of the Japanese Import Duty Rate Study Council.

The recommendation for an increase of from 10 pct to 15 pct was made recently to the Japanese Minister of Finance.

Primary aluminum is due to be placed on Japan's automatic approval import allocation list.

Steel Products Exports, Imports Both Rise

Exports and imports of steel mill products climbed in November, according to the latest statistics of the Dept. of Commerce. Exports were up 23 pct over October. Imports

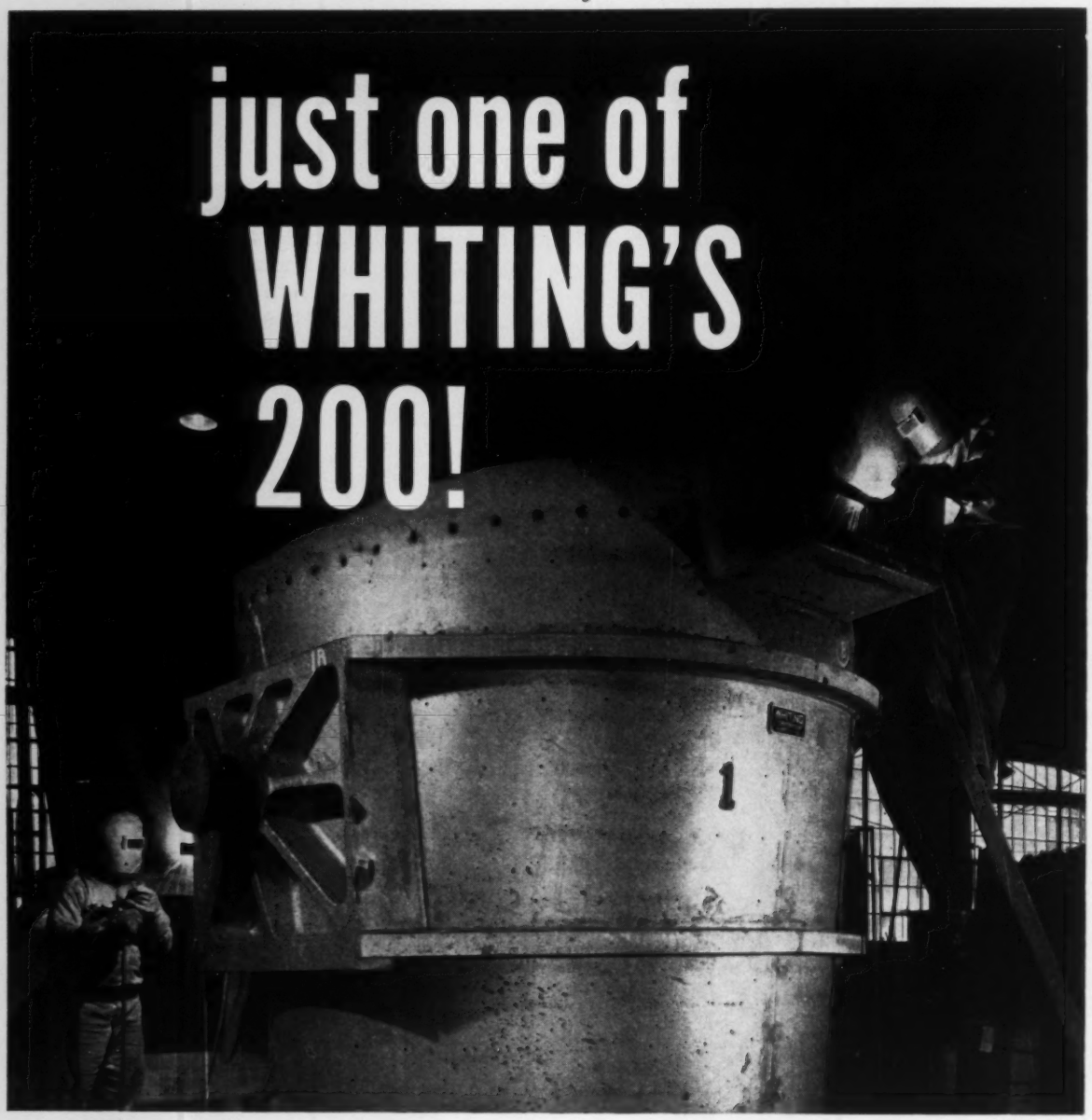


rose only a third as high, after taking a drop in October.

A total of 284,000 tons were exported in November. That's 53,000 tons more than the previous month and four times the strike-reduced tonnage of November, 1959. Structural shapes and semifinished steel made the sharpest gains.

Imports of steel mill products totaled 199,000 tons—a gain of 19,000 tons over October. However, this is still well below the 460,000 tons imported in November, 1959. Bars, wire rods and structural shapes accounted for most of the increase.

The Commerce Dept. notes that 1960 imports will exceed exports in quantity, but exports will be substantially higher in value.



This 60-ton steel mill ladle is just one of more than 200 types and sizes designed by Whiting engineers! Built to A.I.S.E. specs, it features cast steel trunnion bases, forged steel trunnions, and adjustable swivel-type bottom tapping lever for easy control and long service life with low maintenance. Whatever *your* ladle requirements—in capacities from 100 lbs. to 200 tons— Whiting has a profitable answer for you.

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Switch to Metric System?

Spokesmen from the Department of Defense say selective conversion to the metric system could be made by the metalworking industry with little disruption. Recent surveys of engineers and scientists show an increasing desire for the changeover. Major technological advantages are conceded. The DOD stands ready to help in making the switch on an evolutionary basis.

Speeds Radiography

Tests take time. Radiography is no exception. No matter how much equipment is added to a radiographic lab, there's still a bottleneck. This bottleneck centers on film processing. An automatic film-processing unit has broken this production jam at a New York plant. The newcomer completes film processing in only 13 minutes.

New Fork-Truck Clutch

Fork-lift trucks are hard on clutches. A new oil-bath clutch for these vehicles prove superior to dry-type units. It extends clutch life to 10,000 hr, reduces operating costs and insures dependable performance. Hydraulic oil is fed into the clutch's friction disk. Centrifugal force sprays this oil over the friction faces. The oil flows to the housing wall where it's filtered; then it returns to a tank.

Insures Drip-Free Dip

An unusual setup insures drip-free painting. A movable dip tank raises until all parts are immersed in its liquid bath. Then it retracts at a fixed rate. Capillary action and surface tension draw off excess liquid. The film remaining on the parts is uniform and drip free.

Extrude Aluminum Bumpers

Three new alloys from the Aluminum Co. of America may hasten acceptance of aluminum bumpers. These newcomers will also boost use of aluminum in auto trim to another all-time record. The trio consists of two sheet alloys, 5757 and M648, plus an extrusion alloy, 6563. Aluminum test bumpers have been stamped in the same manner as steel bumpers. They've also been extruded in both cold- and hot-forming processes.

Slip Bearings on Shafts

A new process turns out unground bearings with a 15 microinch finish. These bearings operate at speeds in excess of 2000 rpm. A locking compound secures these loose, slip-fit bearings on shafts. Shaft surfaces need not be ground. The new bearings have two-piece, hardened outer races. An unhardened steel jacket holds the outer races together. This jacket absorbs 0.003-0.004 in. compression when the bearings are pressed into a nest or housing.

Isotopes Gage Coolants

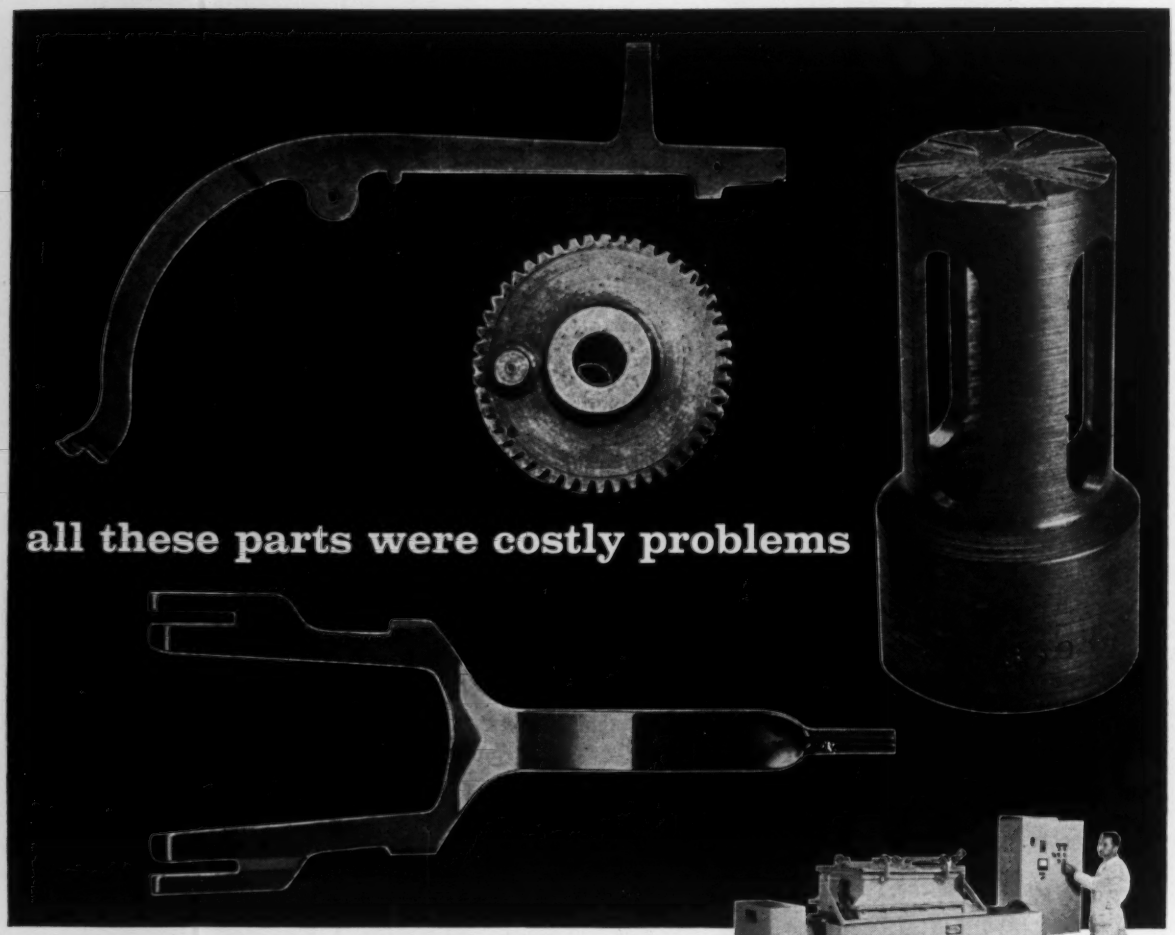
Soviet scientists use radioactive isotopes to evaluate cutting fluids in grinding work. They add a small amount of radioactive material to both normalized and hardened steel samples. Then, using various coolants, they grind these samples. After removing equal amounts of metal, emission readings gage the metal mass adhering to each wheel. Different coolants produce a 300-400 pct variation in metal buildups.

Dent-Resistance Data

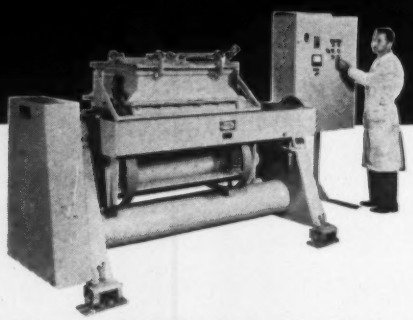
Most magnesium and aluminum alloys boast good dent resistance. On an equal-weight basis, these alloys resist denting better than mild steel. Charts, pinpointing depth of dent versus sheet thickness, have been prepared for several of these magnesium and aluminum alloys.

Rotary Combustion Engine

Engineers from Germany and America report that dynamometer and field tests of the Wankel rotary engine yield great promise. This new gasoline engine is developing much faster than expected. Look for early applications in large- and small-powerplant fields. Weight ratio equals about one pound per horsepower. Basic configuration problems have been solved. Engineering development will proceed as fast as funds allow.



SOLVED by LORCO® vibratory finishing



You can make substantial savings in time and cost of your precision finishing operations—as over 100 other firms have done—with LORCO vibratory finishing equipment.

LORCO vibratory machines will do any finishing operations now being performed in tumbling barrels, of course, in far less time and with invariably superior results. But most important, LORCO equipment can successfully finish parts that can not be done by any other mechanical means. All of the representative parts shown above were costly problems because of their size, shape, fragility, location of burrs, or finishing requirements. All are being finished successfully in Lorco vibratory equipment, with time and cost savings up to 90%.

Parts that are too fragile to tumble—parts having shielded, recessed, or inaccessible burrs—parts requiring the closest precision finishing tolerances can be LORCO Vibrator finished as readily as coarse work requiring severe cut-down.

There's a LORCO vibratory finishing machine for every requirement of production volume and size of parts. Six machine sizes, from ¼ cu. ft. to 16 cu. ft. capacity. Model 1930, illustrated, has 6 cu. ft. load capacity, many exclusive design and operating features.

Our vibratory finishing laboratory stands ready to prove the savings you can make on your toughest finishing problems, with Vibratory finishing. See your Lorco representative or write to Lord Chemical Corp., 2068-C So. Queen St., York, Pa.

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For the ultimate in impact strength . . . this missile launching shoe is FORGED

Low weight, high reliability, shock resistance, great strength, and toughness—this vital part must have all these characteristics, and more. That's why it's drop forged.

Forged steel is a first consideration for high-stress applications. No other process can develop so much useful strength in a piece of steel. But there are other advantages—design freedom, for one. Just look at the complexity of the launching shoe below. Notice the recesses forged right into the product to save weight, reduce machining steps, cut manufacturing costs.

Steel

for Strength . . . Economy . . . Versatility

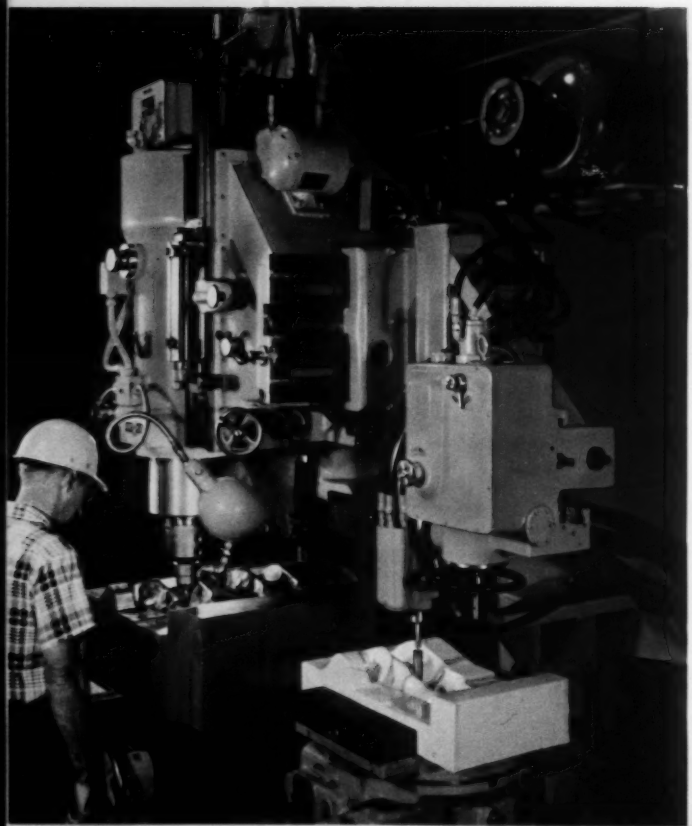
Attached to booster rocket, fore and aft shoes guide missile along overhead rail of launcher.

BETHLEHEM STEEL

Good forgings begin with top-quality steel

High-grade forgings can be made only from top-quality steel . . . such as the carbon and alloy bars, billets, and blooms produced by Bethlehem to high-quality standards. With our close metallurgical control over every step of the manufacturing and rolling processes, Bethlehem produces steels which consistently satisfy our customers' most demanding requirements.

New computer-printer, designed and built by Bethlehem engineers, tabulates and teletypes spectrographic analyses for metallic elements direct to the furnace floor automatically. It now takes but two minutes for the furnace operator to learn the exact chemistry of the steel being made, allowing him unprecedented control over the composition of the steel.



Forging design— key to low-cost, long-service parts

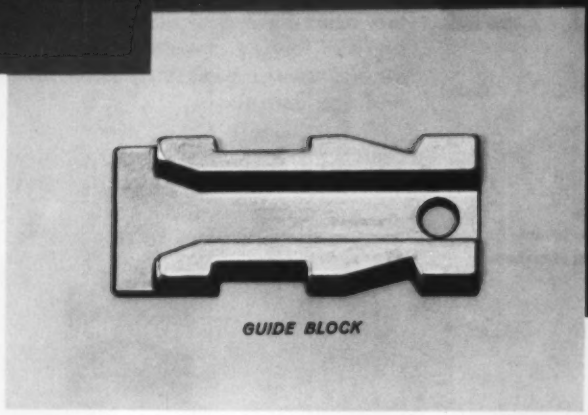
With the modern techniques and modern steels available to the forgings engineer, he is able to translate almost any parts problem into a practical forging design. And with the forge shops' modern equipment, forgers can quickly turn the design into an accurate steel forging.

Properly designed, forgings can meet *your* parts requirements of low weight and high strength, low cost and long life, fast production and top performance. A forgings engineer will be glad to show you how—his services are available through your forgings supplier.

Automatic die-sinking machine accurately duplicates the die shape in an alloy-steel die block by tracing a full-scale model of the forging die. Lower-cost, more-precise dies are the result. And for added savings, replacement dies can be produced with identical accuracy when the forging run exceeds the die life.

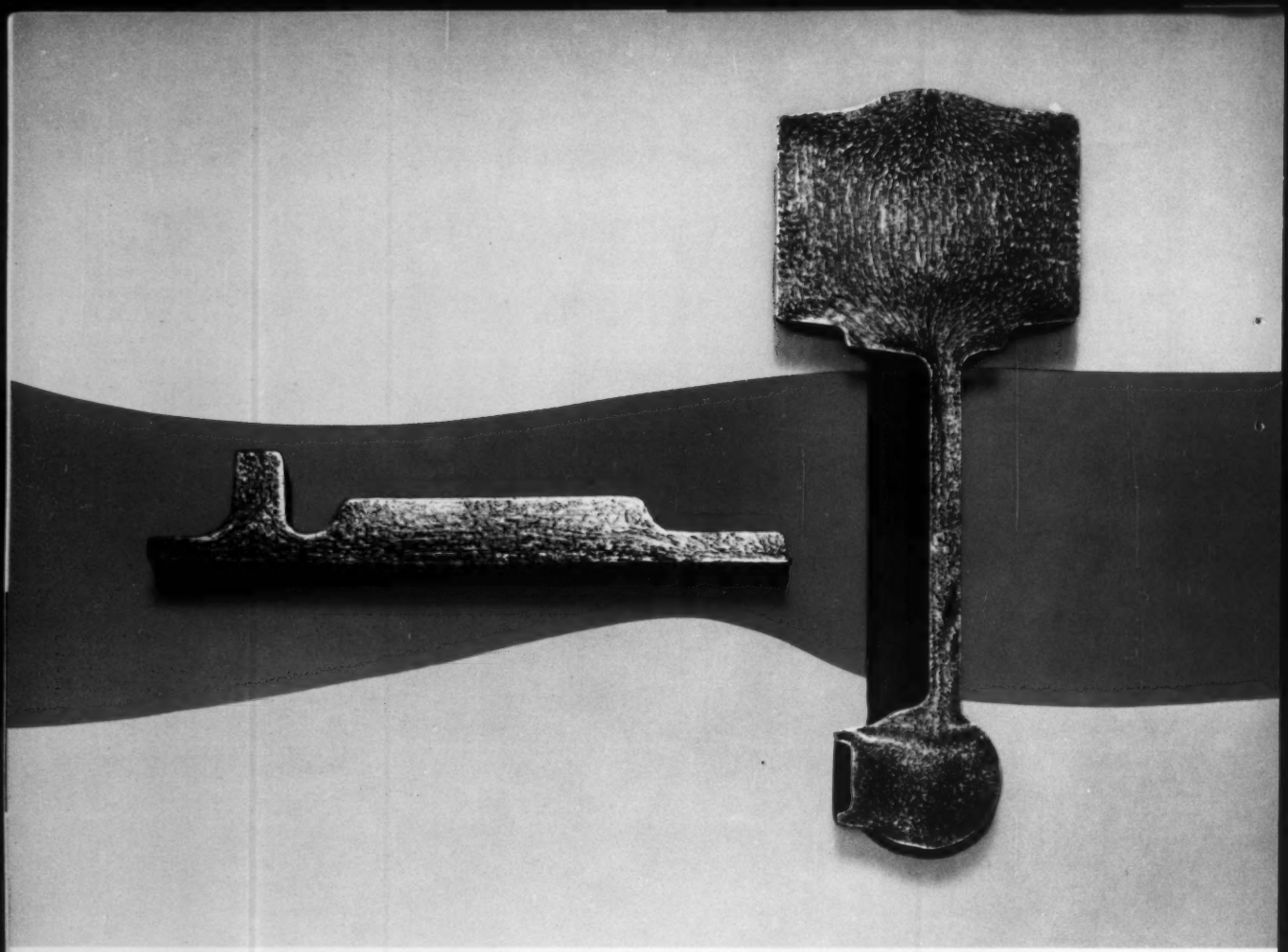
Forgings are so often the best answer:

low cost per unit
reduction of machining time
elimination of fabricating operations
improved design
increased strength/weight ratio
long service life



BETHLEHEM STEEL

BETHLEHEM STEEL



Flowlines tell the story

When quality steel forgings are cut in half, polished, etched, and dyed, one major reason for their great strength and toughness stands out clearly. These are the flow lines, evidence of the directional flow of the steel as it has been worked within the closed-die cavity. This pattern determines the areas of maximum strength in the forging, and is controlled primarily by the shape of the die.

Your forgings supplier knows how to work steel to give the forging its greatest strength where most needed. *But the quality of the steel is a forging's most important ingredient.* This is why so many forgers come to Bethlehem for their steel requirements—carbon and alloy steels which must meet the varied but exacting specifications required by the many types of forging processes. They've found they can depend on the quality of Bethlehem steels. You'll find you can, too.

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Please send me the booklets I have checked:

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- ☐ **415-D, Quick Facts about Alloy Steels, Fifth Edition**
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Capacity Hassle

Sir—It looks as though you will need to add to your own record of great achievements in the iron industry news field by supplying what the "ostriches" in the front offices of the steel industry are going to experiment in hiding.

Having gone through a similar move in the copper industry in 1931, I can speak from experience. In 1931 I was with the American Bureau of Metal Statistics. I well remember the day that our able director, Walter Renton Ingalls, returned from a meeting with Kennecott Copper's president and the news that Kennecott would no longer supply us with the data of its production, smelter and refinery stocks on copper. This ended suddenly a series of statistics which the commercial world had learned to use effectively. Unfortunately, the purchasing agents would look at the figures of copper stocks and they would buy weakly or strongly by how bad or how good the stock figures looked. The Kennecott "ostrich" hid its head in the mud and the managers of that business lost the ability to keep a good view of what the whole industry was doing.

But the hiding of the figures did not stop the weakness of the copper market. It accentuated the weakness.

I watched with horror the decline of the gross revenue from the production of refined copper by 93 pct in 1929 to 1932. The price fell from 18 cents to 5 cents a pound and the volume fell 75 pct. Interestingly enough, the present manager of Kennecott came from the steel industry and he knows the value of good statistics.

The steel industry cannot easily hide their "percent of capacity" data. They will be published by various statisticians, some good and some poor. You will do the steel industry a service by using your exceptionally effective information gathering system in carrying along a series of "percent of capacity" reports which will be as able and as accurate as those of the American Iron and Steel Institute. Doubtless yours will be corrected from time to time—as are those of the Iron and Steel Institute. — Robert B. Dickson, president, Dickson Weatherproof Nail Co., Evanston, Ill.

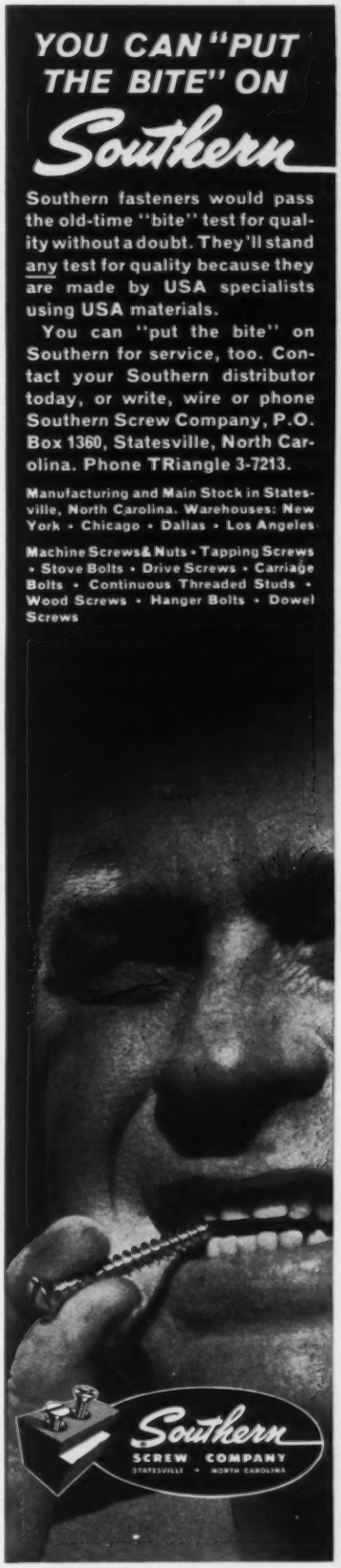
More on ILO

Sir—With reference to the recent items on the International Labor Organization (IA, Oct. 13, p. 9; Nov. 17, p. 23) I wish to state that—to the best of my knowledge—ILO is the only international body which consequently refuses admittance to the delegates of Hungarian Reds since the Hungarian Revolution of 1956 ended with the execution, deportation or imprisonment of the leaders and oppression of all members of that nation's working people. This honest and clear-cut attitude of that allegedly Red-dominated organization has not yet been followed by such respectable and far - from - being - brow-beaten-by-Communists bodies as, for instance, the United Nations, the International Pen Club or the Interparliamentary Union.

■ **The name of this writer, a former faculty member at a technical college in Hungary, has been withheld by The IRON AGE.—Ed.**

Commendation

Sir—We take this opportunity to commend you on your editorial of Dec. 29 entitled "The Human Being: He Is Most Important."—Edward G. MacLennan, vice president, Superior Castings Co., North Hollywood, Calif.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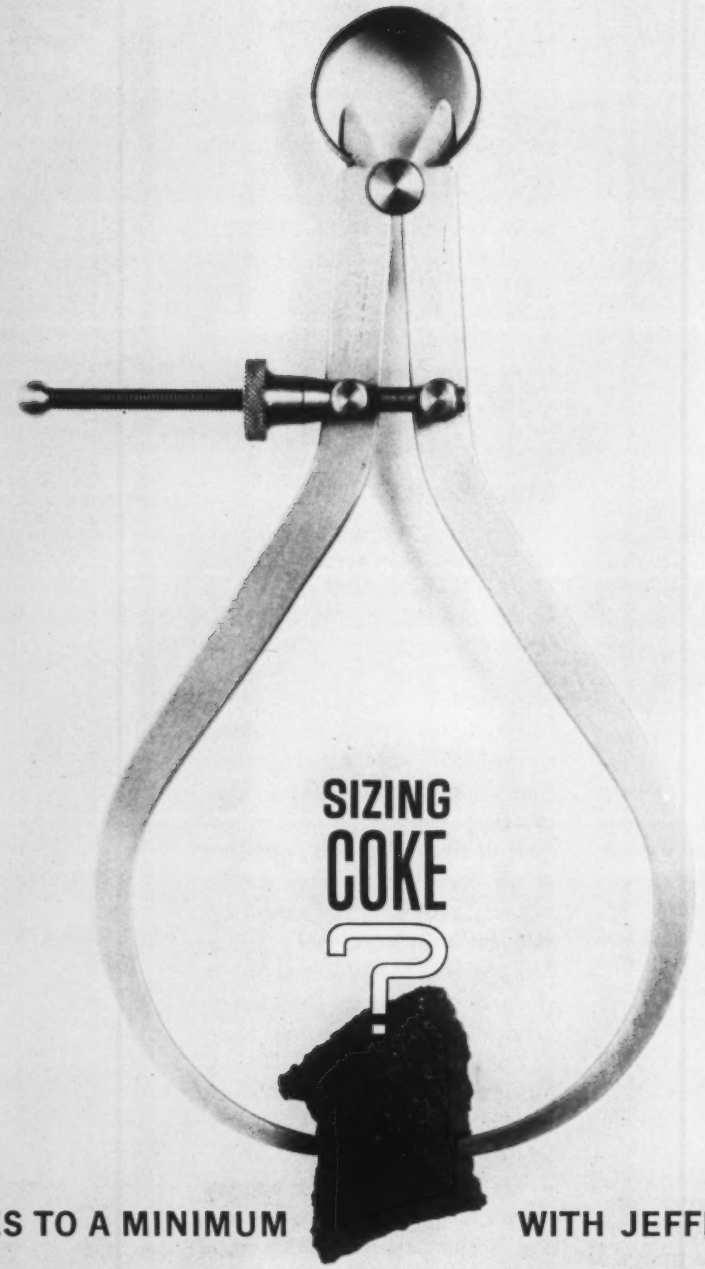


HOLD FINES TO A MINIMUM WITH JEFFREY CRUSHERS

Rolls on Jeffrey double roll coke sizers are fitted with renewable segments having thin, blade-shaped teeth. These provide a cutting action especially designed for handling coke. Sizing is surprisingly accurate and fines are held to a minimum. Whether you plan to size 8 tons per hour or 400 tons, there is Jeffrey equipment to handle the job — to pass a ¾-inch screen or through 4-inch openings. For help on coke sizing, get in touch with The Jeffrey Manufacturing Company, 912 North Fourth Street, Columbus 16, Ohio.

JEFFREY

FATIGUE CRACKS

Steel Labor Report

Labor is another one of the many areas where The IRON AGE will be found right on top of the news, reporting and interpreting it for our metalworking readers—whether it pertains to steel, automotive, electrical or other industries.

This week's Special Report on the Labor Dept.'s study of industrial relations in the steel industry is another example of how well our editors follow a story through to the end.

Fast Work — Our Washington editor, Ralph Crosby, broke the story several months ago (IA—Oct. 27 '60, p. 60) based on the Labor staff's first draft. Yesterday, Secretary of Labor James Mitchell released the "substantially revised" final draft. And once again Ralph has done an excellent job of reporting.

Working just as swiftly, editor-in-chief Tom Campbell parallels Ralph's job with an interpretation of the study, drawing on his intimate knowledge of the steel industry and the people in it— both labor and management.

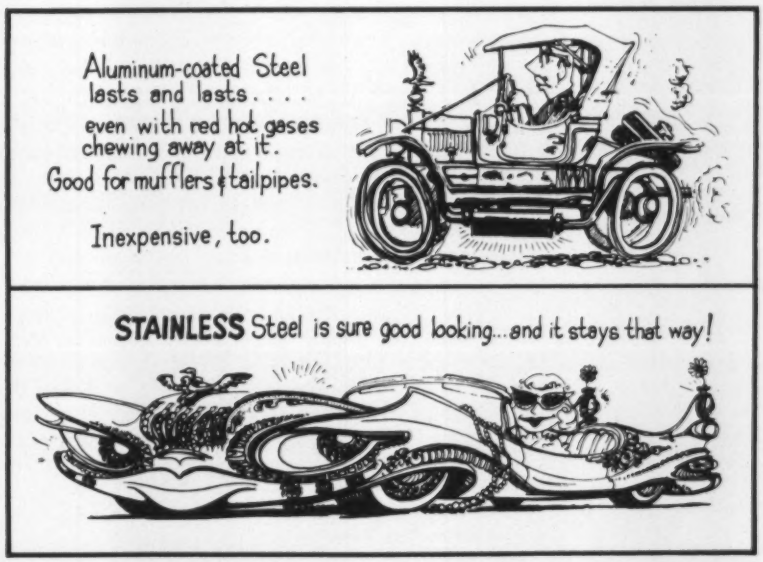
Another Big Year—Timely reporting of labor—and other—news happenings has become routine with The IRON AGE. But it takes more than routine reporting to do the job. We are sure our readers recognized this type of job when Tom covered steel industry negotiations a year ago. And they look forward to his "ahead of the happenings" reporting.

This is going to be another year in which labor-management relations will assume an important place in the news. And we believe our editors will be right on top of it all of the way.

Design Your Own

Ever think it would be interesting to design your own car? Some wonderful and wild possibilities are suggested (tongue-in-cheek) in a new booklet by U. S. Steel Corp.

Dual Purpose—Applying a light touch to a serious subject, USS has come up with a cartoon "do-it-yourself" automobile design booklet. While having a little fun with auto design (see examples, below), the booklet is designed to acquaint engineers with the qualities of steels available for auto use.


Aluminum-coated Steel lasts and lasts....
even with red hot gases chewing away at it.
Good for mufflers & tailpipes.
Inexpensive, too.
STAINLESS Steel is sure good looking...and it stays that way!

DO-IT-YOURSELF DESIGN: New USS booklet gives you a chance to design cars, all in fun of course. (For details, see story above.)

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Aldrich Air-Driven Hydraulic Pumps are rugged, compact... the perfect answer for production or laboratory needs... Operate on normal plant air... Immediate shipment from factory stock.

FOR HIGH PRESSURE VESSELS—Maker of unfired pressure vessels tests production units with Aldrich air-driven hydraulic pump, in accordance with A.S.M.E. Boiler and Pressure Test Code.

OR CASTINGS—Castings and forgings for missile, nuclear, and other industries are tested in this rig on a production-line basis. Source of hydraulic pressure is an Aldrich pump. This unit has capacity of 12,100 psi. Other pumps available for pressures to 50,000 psi. Special units to 100,000 psi.

Aldrich air-driven hydraulic pumps are dependable, economical to operate and easy to install. Write today for Data Sheet 36 (6-inch stroke) or Data Sheet 36A (3-inch stroke).

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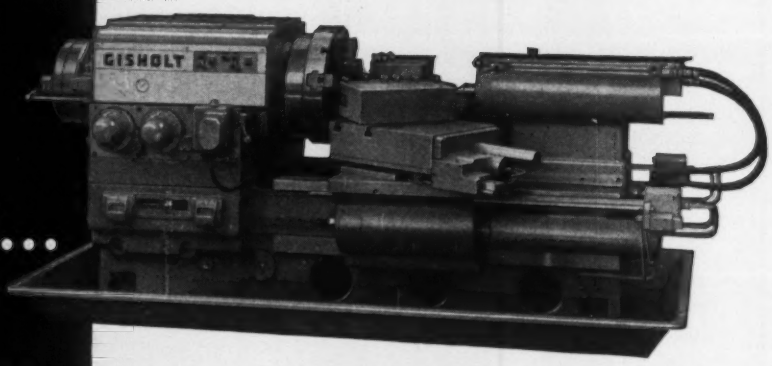


that's why the

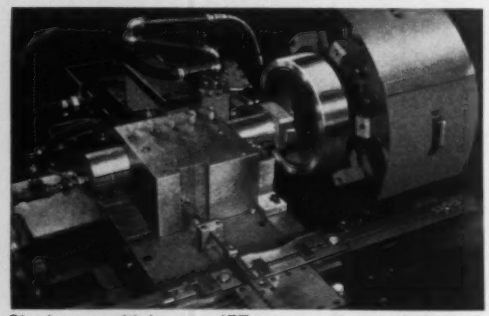
GISHOLT No. 24

Automatic Chucker

cuts costs four ways

This setup cut O.D. machining time 27% on diesel cylinder liners. Basic design of No. 24 offers flexibility and power to handle multiple surfaces on large parts. Nineteen tools machine 16 surfaces in only 6 minutes f.t.f.

Time was reduced 30% on 60 part sizes with this setup. Front and rear independent slides are placed to suit the work. Optional swivel bases speed angular settings. F.t.f. time on the 15¾" steel outer bearing race shown, only 3 minutes.



Single- or multiple-pass JETracers on the rear independent slide increase versatility. Here a single-pass JETracer handles six types and 24 sizes of steel bearing races. Two 8-minute operations complete part shown, removing 90-lb. metal, holding .0005" tolerance in spherical bore.

When you bring the speed and the versatility of the Gisholt MASTERLINE No. 24 into your shop, here's what happens:

1. You profit from high-speed, automatic production on a wide range of work, from small lots to long runs.
2. You get the production of an expert from an inexperienced operator. Automatic cycle gives you repeat accuracy and optimum tool life at fixed production rates.
3. You reduce labor requirements—one operator handles two or more machines.
4. You get the speed, the power, the rigidity to take full advantage of today's most advanced cutting tools for maximum metal removal and finer finishes.

The jobs at the left are just a small sample of what you can do on the fast, versatile Gisholt MASTERLINE No. 24 Automatic Chucking Lathe. What can it do...how much can it save on your work? Find out. Call your Gisholt Representative or write for Bulletin 1213.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

Investigate Gisholt's Extended Payment and Leasing Plans

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes
• Factory-Rebuilt Machines with New-Machine Guarantee

COMING EXHIBITS

Plant Maintenance & Engineering Show — Jan. 23-26, International Amphitheatre, Chicago. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

International Heating & Air-Conditioning Show—Feb. 13-16, International Amphitheatre, Chicago. (International Exposition Co., 480 Lexington Ave., New York 17.)

MHI Pacific Coast Show—Feb. 22-24, Cow Palace, San Francisco. (Material Handling Institute, Inc., One Gateway Center, Pittsburgh 22.)

Western Metal Show — March 20-24, Pan Pacific Auditorium, Los Angeles. (American Society for Metals, Metals Park, Novelty, O.)

MEETINGS

JANUARY

Compressed Gas Assn., Inc.—Annual meeting, Jan. 23-24, Waldorf-Astoria, New York. Association headquarters, 11 West 42nd St., New York.

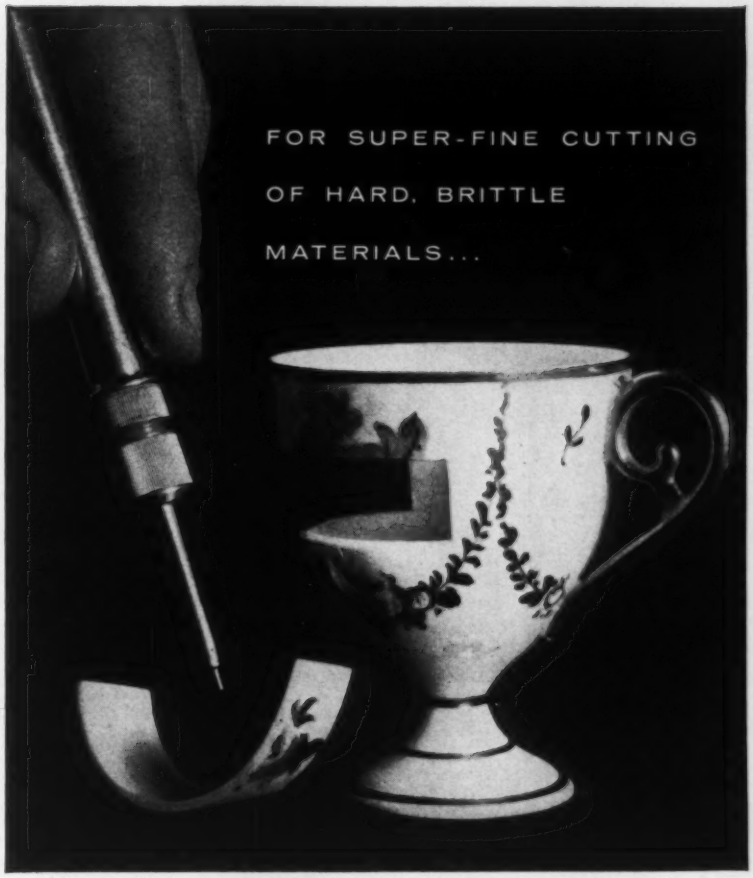
Industrial Heating Equipment Assn., Inc.—Annual winter meeting, Jan. 23-24, Dearborn, Mich. Association headquarters, 2000 K St., N. W., Washington, D. C.

Instrument Society of America — Annual meeting, Jan. 23-25, Hotel Astor, New York. Society headquarters, 313 — 6th Ave., Pittsburgh.

Society of Plastic Engineers, Inc.—Annual Technical meeting, Jan. 24-27, Shoreham & Park Sheraton, Washington, D. C. Society headquarters, 65 Prospect St., Stamford, Conn.

National Tool & Die Manufacturers Assn.—Winter board meeting, Jan. 24-28, Biltmore Hotel, Palm Beach, Fla. Association headquarters, 907 Public Square Bldg., Cleveland.

Mining & Metallurgical Society of America—Annual dinner, Jan. 25, Mining Club, New York. Society



THE S. S. White Industrial Airbrasive Unit

We don't recommend slicing up the family's fine Limoge China, but this does illustrate the precisely controlled cutting action of the S. S. White Airbrasive Unit. Note how clean the edge is, and how the delicate ceramic decoration is unharmed.

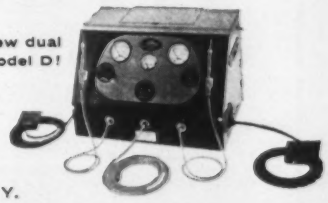
The secret of the Airbrasive is an accurate stream of non-toxic abrasive, gas-propelled through a small, easy-to-use nozzle. The result is a completely *cool* and *shockless* cutting or abrading of even the most fragile hard materials.

Airbrasive has amazing flexibility of operation in the lab or on an automated production line. Use the same tool to frost a large area *or* to make a cut as fine as .008"!...printed circuits...shaping and drilling of germanium and other crystals...deburring fine needles...cleaning off oxide coatings...wire-stripping potentiometers...engraving glass, minerals, ceramics. Jobs that were previously thought impossible are now being done.

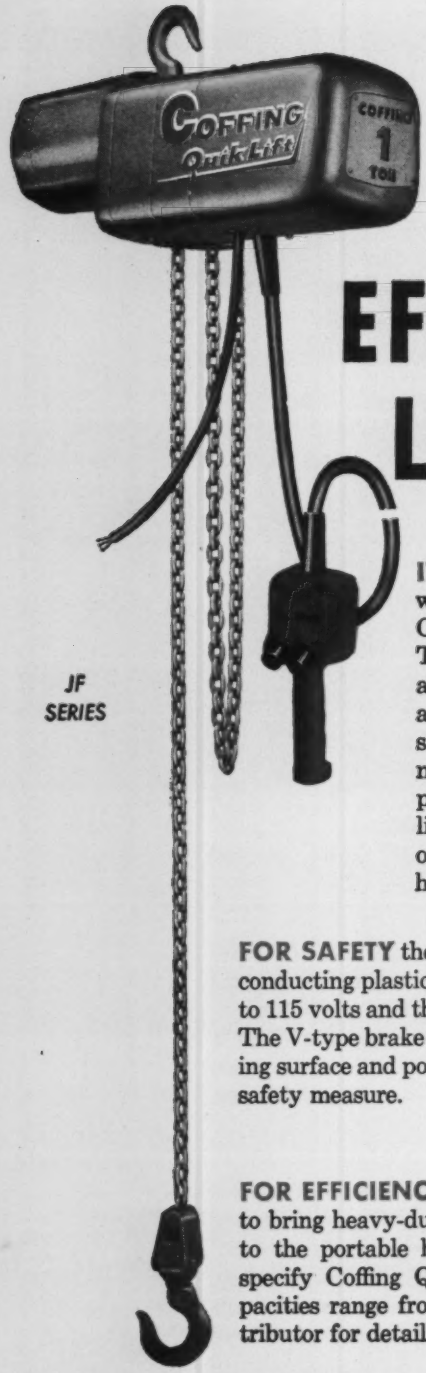
Send us samples of your "impossible" jobs and we will test them for you at no cost.

SEND FOR BULLETIN 6006
...complete information.

New dual Model D!



S. S. White Industrial Division
Dept. 32A, 10 East 40th Street, New York 16, N. Y.



JF SERIES

EASY SAFE EFFICIENT LIFTING!

IT'S EASY to raise or lower loads while pulling a trolley mounted Coffing Quik-Lift Electric Hoist. The pistol-grip control station and the combination strain cable and control cord makes this possible. The light but strong aluminum housing provides ease of portability. Changing voltages, limit switch, type of suspension or chain is quick because the housing is in sections.

FOR SAFETY the control station is made of non-conducting plastic in which the voltage is reduced to 115 volts and the push-buttons are interlocked. The V-type brake which provides maximum braking surface and positive control of loads is another safety measure.

FOR EFFICIENCY this hoist has been designed to bring heavy-duty performance plus durability to the portable hoist field. It will pay you to specify Coffing Quik-Lift. Twenty models—capacities range from ¼ to 2 tons. Ask your distributor for details or write for Bulletin ADH-65.

COFFING HOISTS

DUFF-NORTON COMPANY

Four Gateway Center · Pittsburgh 22, Pa.

COFFING HOISTS
Ratchet Lever • Air
Hand Chain • Electric

DUFF-NORTON

DUFF-NORTON JACKS
Ratchet • Screw
Hydraulic • Worm Gear

MEETINGS

headquarters, 11 Broadway, New York.

Metal Lath Manufacturers Assn.—Meeting, Jan. 25-26, Pick-Carter Hotel, Cleveland. Association headquarters, Engineers Bldg., Cleveland.

Cutting Tool Manufacturers Assn.—Annual business meeting, Jan. 26, Harmonie Club, Detroit. Association headquarters, 1216 Penobscot Bldg., Detroit.

National Assn. of Secondary Material Industries, Inc.—Midwestern Div. regional meeting, Jan. 26, Statler-Hilton Hotel, Detroit. Association headquarters, 271 Madison Ave., New York.

Association of Roller & Silent Chain Mfrs.—Meeting, Jan. 26-27, The Drake Hotel, Chicago. Association headquarters, 3343 Central Ave., Indianapolis, Ind.

Truck-Trailer Manufacturers Assn., Inc.—Annual convention, Jan. 29-Feb. 1, Hollywood Beach Hotel, Hollywood, Fla. Association headquarters 710 Albee Bldg., Washington, D. C.

American Institute of Electrical Engineers—Winter general meeting, Jan. 29-Feb. 3, Statler-Hilton Hotel, New York. Institute headquarters, 33 West 39th St., New York.

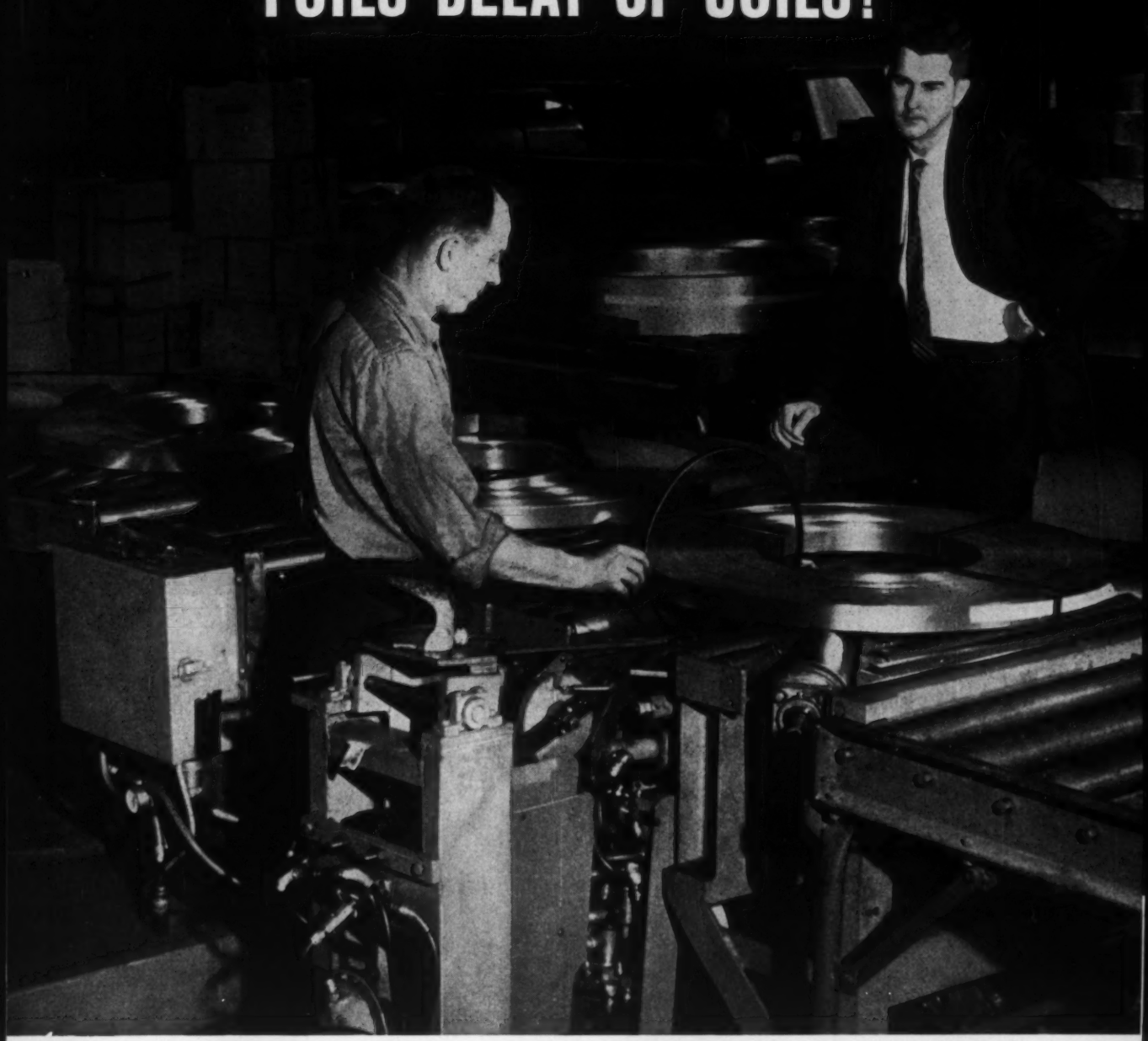
Steel Kitchen Cabinet Manufacturers Assn.—Midyear meeting, Jan. 31, Sheraton Towers Hotel, Chicago. Association headquarters, 910 Park Bldg., Cleveland.

FEBRUARY

American Foundrymen's Society—Wisconsin regional foundry conference, Feb. 9-10, Hotel Schroeder, Milwaukee. Society headquarters, Golf & Wolf Rds., Des Plaines, Ill.

National Assn. of Manufacturers—Meeting, Feb. 15-17, The Riviera Hotel, Palm Springs, Calif. Association headquarters, Two E. 48th St., New York.

FOILS DELAY OF COILS!



Acme Idea Man Gene Fairbank (right) suggested Idea No. S4-12 to United Flat Rolled Products, Chicago.

United Flat Rolled Products, Chicago, beat bottlenecks in slit coil production with a conveyorized Acme Steel F4 Strapping Machine—and tripled production capacity in the process!

Slow hand strapping methods tied up slitting equipment as much as 45 minutes per hour. Now, slit coils flow smoothly from slitter to strapping machine on roller conveyors. One operator, handling both coil tying and unitizing operations, keeps well ahead of two slitters.

Solving sluggish production problems is an every-day challenge to your Acme Idea Man. For full details, call him or clip the coupon.

ACME STEEL IDEA LEADER IN **STRAPPING**

ACME STEEL COMPANY
Acme Steel Products Division
Dept. IFS-11
135th St. & Perry Ave.
Chicago 27, Ill.

Please send me Idea No. S4-12 and examples of how major companies in my field use Acme Steel Strapping.

*Name*_____

*Title*_____

*Firm*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

No more hand stacking. This newspaper counter-stacker counts and stacks newspapers automatically—and can be programmed to automatically vary the stacks to meet route schedules.

No more dry pumping. Cutler-Hammer's new development—an automatic pump off control for stripper oil wells—stops the pump when oil has been lifted. Saves the pump, ups production.

What's new in control for automation?

A blast furnace that charges itself

More efficient automation because the Cutler-Hammer control systems man was called in at the start of planning. The art of charging a blast furnace is now a science.

Cutler-Hammer control engineers, with the furnace builders, worked three years to put all charging control functions into one integrated system. Now, the proper material in the proper amounts, all in a proper sequence are delivered to the furnace bell—automatically.

Every step of the operation can be checked visually on master control panels. Nothing is left to chance. The added cost of this kind of charging control is relatively insignificant. Complete flexibility in selection of furnace charging programs now makes possible optimum blast furnace performance.

Why you should call in the electrical control man early. Cutler-Hammer has been increasing productivity and lowering costs for many different companies in many different industries for years. This is a major reason why Cutler-Hammer should be called when you *start your automation planning.*

The company on the move. There's a new vitality at Cutler-Hammer—a new desire to solve problems. We've planned for the gigantic expected growth of the sixties and now we're ready—with new plants, new engineering talent, new and better products. We'd like to tell you about ourselves if you're planning ahead. Contact the Cutler-Hammer sales office nearest you.

Automation is more efficient when the control expert is called in early.

WHAT'S NEW? ASK...

CUTLER-HAMMER

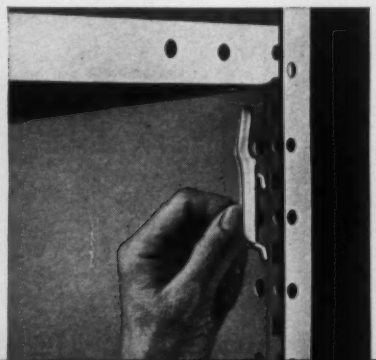
Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

WILSON SPORTING GOODS CO., the Nation's leader in the manufacture of sporting goods equipment, used Republic METAL LUMBER in constructing 35,136 cubic feet of custom-built storage at the River Grove, Illinois, distribution center. Racks can be unbolted, bin sizes changed, intermediate pallet rests installed, quickly and easily to meet changing storage requirements.

SMALL SECTIONS OF METAL LUMBER were used as hold-down brackets to anchor the framing to the floor. No wasted material. Republic METAL LUMBER is ideal framing material for building strong and sturdy work benches, cat-walks, ramps, ladders, and other framing assemblies tailored to your specific needs. Bonderized finish reduces maintenance costs, too.

REPUBLIC STEEL LOCKERS give change, wash, and dress centers a new look, protect employee valuables and tools. Available with popular locking devices. Bonderized. Republic will help you with your locker planning, and assume full responsibility for installation. Send coupon.

REPUBLIC CLIP SHELVING is designed to ease and speed erection, to provide quick rearrangement of parts without disassembling the unit. Strong, sturdy, rigid installation every time. Compression type clip securely holds shelf in place without bolts or special adapters. Write today.



REPUBLIC MATERIAL HANDLING UNITS save time, simplify stack, store, ship operations. Heavy duty stacking brackets and corrugated construction combine to deliver long, efficient safe service at low per year cost. Republic material handling specialists work with you. Call or write.

Wilson Sporting Goods Co.
stores 1,001 sizes and shapes with

Republic METAL LUMBER

. . . building product of 1,001 uses!

How to store 1,001 different items of different sizes, different shapes, was solved by the Wilson Sporting Goods Co. by using Republic METAL LUMBER in designing a modern distribution system at their River Grove, Illinois, plant.

Wilson set up a high ceiling (22 feet), live-storage area, uncluttered by partitions and served by lift trucks. Just over four miles of .104 gage Republic METAL LUMBER was used in constructing 35,136 cubic feet of storage space, 612 feet of racks 16½ feet high, bins 3- and 4-feet deep.

According to Wilson's warehousing experts, this system gives them more usable storage space, plus safety for both men and merchandise. The hazards of pallet-load piled on pallet-load of the old system were eliminated.

METAL LUMBER is easy to use. Simply measure, cut, assemble. Engineered pattern of slots speeds erection, reduces time and material costs. Available in two gages, two widths, in standard bundles of 10- or 12-foot lengths. Call your Republic representative. Or, send coupon for attractive brochure.

ADDED STRENGTH was achieved by splicing small lengths of METAL LUMBER to framing members. METAL LUMBER is never obsolete. Its cut-and-join simplicity makes quick assembly possible even with unskilled labor. Its reusable features further reduce costs. Republic METAL LUMBER may be your answer to difficult framing problems. Try a bundle and see.

WILSON'S SOLUTION to more storage space was a pallet rack system constructed of Republic METAL LUMBER. An overhead trolley chain running around a perimeter aisle pulls floor trucks to the main aisles. Lift trucks are used to stack and store, and load and ship orders from the more than 1,000 different items on the shelves. Service, efficiency, economy.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

STRONG . . . MODERN . . . DEPENDABLE

REPUBLIC STEEL CORPORATION
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1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on the following products:

☐ Republic METAL LUMBER® ☐ Republic Steel Lockers
☐ Clip Shelving ☐ Republic Material Handling Units
☐ Have representative call

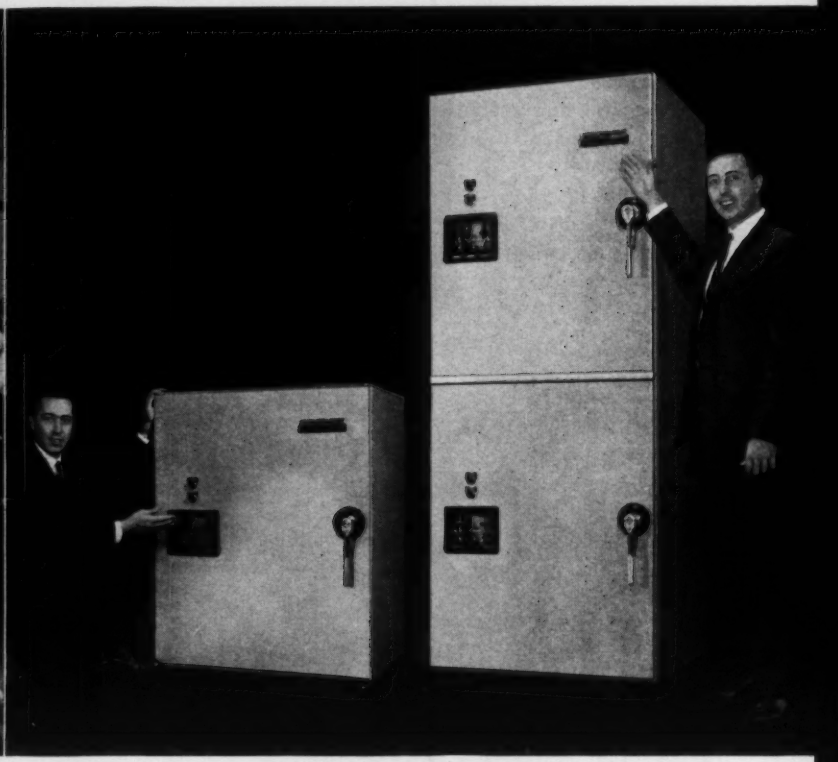
Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

ideas and news:



Fully adjustable stator blade control: Extends range of highly efficient axial compressors. Combines ability to meet fluctuating demands at constant speed with basic axial design advantages . . . steam savings of over 10%, and space and weight savings 25 to 50% of that required by comparable centrifugal compressors.

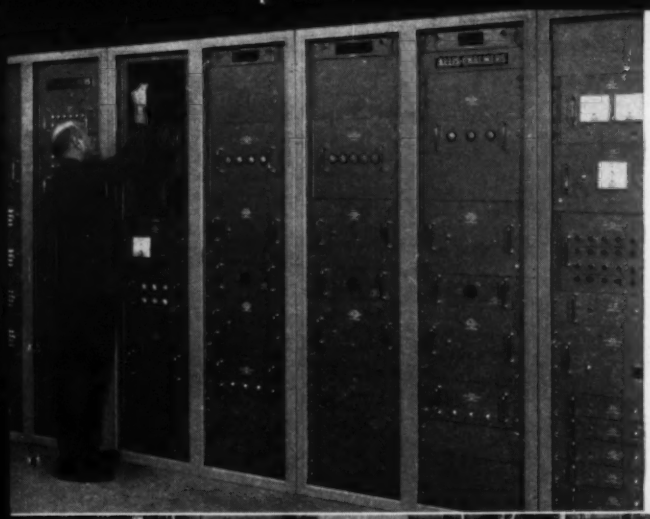
So low, two fit where one used to go: This new SpaceMaker control center is the first completely new 2- to 5-kv motor controller in more than a decade. Two-high design can cut floor space requirements in half. Complete drawout construction makes it the safest, most easily accessible controller on the market. New flame-retardent, track-resistant Super Pyro-Shield insulation adds to reliability, reduces size and weight. And, the all-new roll-out contactor is designed to cut maintenance time.

Which of these productive ideas could be working for you?

Screens that can't blind. Compressors with adjustable capacity at constant speed. These examples demonstrate the extra value that is standard with Allis-Chalmers . . . the greater efficiency and the added productivity which are yours when you buy A-C products, systems and services. Call your Allis-Chalmers representative for details on A-C "worth-more" features. Or write Allis-Chalmers, Industrial Equipment Division, 900 S. 70th Street, Milwaukee 1, Wisconsin.

A-1399

Systemation is an Allis-Chalmers servicemark. *SpaceMaker* and *Pyro-Shield* are Allis-Chalmers trademarks.



For quality control . . . lower processing costs: Systemation engineers at Allis-Chalmers will undertake responsibility for the design of complete operating facilities. Systemation service is based on a thorough understanding of your processing requirements gained from years as a major equipment supplier to your industry. Added is the experience of over 500 successful advanced electronic control systems by Consolidated Systems Corporation, an affiliate company.

Sixty-eight motors power plating rolls: When this electrolytic tin line went into operation in 1960, 68 Allis-Chalmers totally-enclosed fan-cooled dc gearmotors powered the plating rolls. Additional Allis-Chalmers motors and supporting motor-generator sets provide power throughout the line. Whether small process line drives such as these, or huge main mill drives, A-C motors have earned a reputation for long life and trouble-free operation.

Screen moist, sticky ores without blinding: Allis-Chalmers new loose-rod deck for vibrating screens makes finer separations — down to ⅜ or ¼ in. — at increased capacity and improved efficiency. The rods roll and bounce, freeing themselves of sticky material. Similar cost-saving advantages are also found in A-C hot sinter screens and sizing screens.

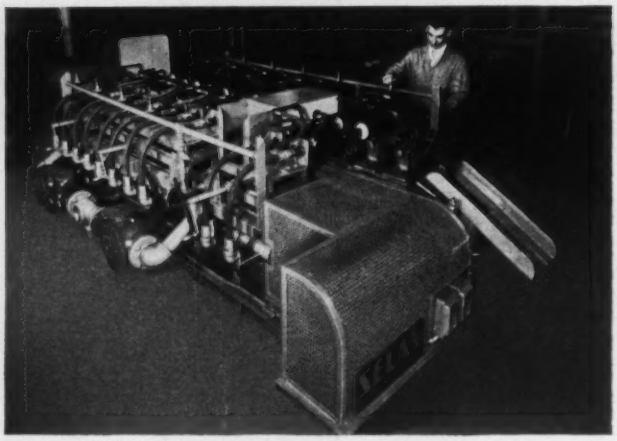
A-C INDUSTRIAL EQUIPMENT DIVISION: motors, generators, controls, rectifiers, pumps, compressors, grinding mills, screens, industrial systems.

OTHER A-C PRODUCTS: thermal, hydro and atomic electrical generating equipment; switchgear, transformers, unit substations; tractors, earth-moving equipment, engines, lift trucks.

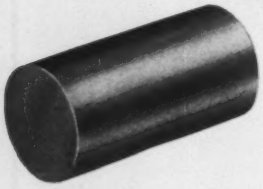
ALLIS-CHALMERS

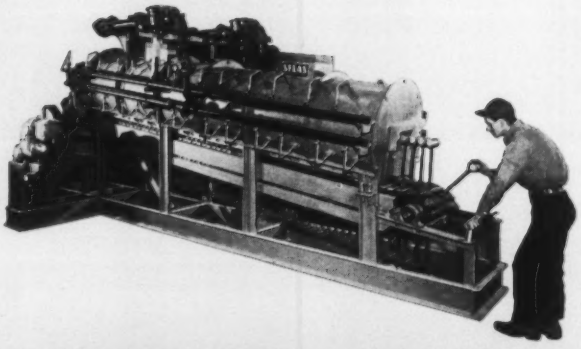
NEW SLANTS ON HEAT PROCESSING FROM SELAS

here's how industry cuts costs product quality with Selas

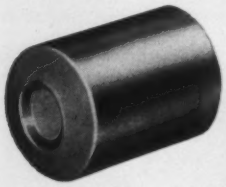


SELECTIVE HARDENING: *Both faces of sledge-hammer-heads are selectively hardened and tempered in a continuous operation. Tempering, previously requiring hours, now performed in minutes. Machine handles wide variety of sizes and shapes of heads. Integration with preceding grinding step enables operation of machine with no additional labor.*



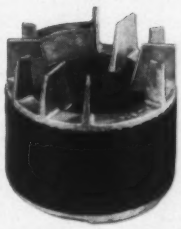


HEATING FOR FORGING: *Brass slugs — ⅞ to 2" diam., 2½ to 8" long — are heated to 1390°F in this automatic machine at high production rates. Selas fast, uniform heating produces fine grain size, improved physical properties.*



ANNEALING: *Unique Selas gas-fired machine anneals brass door knob blanks — automatically in the production line — as part of a completely integrated manufacturing process. Selas Superheat burners fire a narrow jet of high velocity, high temperature gases at a 1⅜ in. band on sidewall of blank. Annealing, cooling and discharge, accomplished in 9 sec, are geared to production line output of 60 finished knobs each minute. Fast Selas heating by non-oxidizing combustion gases achieves a cleaner, brighter end-product . . eliminates need for muffles or prepared atmosphere.*

. . . improves Heat Processing Equipment



POST HEATING: *After aluminum rotors for electric motors are die-cast, they are post-heated to approximately 950°F in this continuous, automated machine, at the rate of 375 pieces per hour to improve electrical characteristics. This equipment, which occupies an area of only 7 square feet, provides a fast, convenient method for shrink-fitting rotors to shafts, and replaces both manual heating and a press fitting operation.*

The installations on these pages demonstrate how Selas automatic heat processing equipment

- cuts operating costs
- increases production rates
- minimizes in-process inventory
- reduces labor requirements
- saves valuable floor space
- improves product quality

Specifically designed and custom-built to meet your individual production requirements and job specifications, Selas heat processing equipment employs time-proven standardized engineering features for longtime operating dependability and minimum initial investment. Problems usually associated with divided responsibility are avoided since Selas starts-up and services every machine it designs and builds.

Selas automatic or semi-automatic heat processing equipment can help you produce better products at lower costs. At your convenience—without obligation to you—a Selas field engineer would welcome the opportunity to survey your requirements.

For this free, personal service, or for literature on any of the heating operations shown here, write Mr. W. B. Troupe, General Industry Division.

SELAS CORPORATION OF AMERICA
11 Dreshertown Road, Dresher, Pa.

EUROPEAN SUBSIDIARY: Selas Corporation of America, European Div., S.A., Pregny, Geneva, Switzerland. INTERNATIONAL AFFILIATES: FRANCE—Societe Exploitation de Produits Industriels, Paris; JAPAN—International Machine Co., Ltd., Tokyo.

SELAS

HEAT AND FLUID PROCESSING ENGINEERS

DEVELOPMENT
•
DESIGN
•
CONSTRUCTION

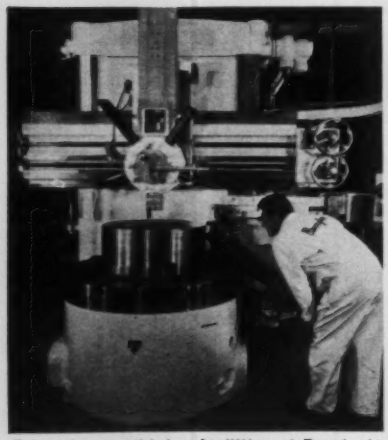
Tools of BERYLCO Leadership...Finest Facilities, Proven Abilities for Research, Production and Fabrication of Beryllium

A new plant at Hazleton, Pa., expanded facilities at the Reading, Pa. plant, new production methods . . . all these developments are a result of BERYLCO vision in meeting the increasing demand for beryllium. Aircraft and missile makers turn to BERYLCO because of the *depth* of the beryllium metal service. As a result, structurals and components of BERYLCO beryllium are doing key jobs today in missiles and aircraft that could never be performed before. Research and development facilities plus a well-schooled and experienced technical staff are an important part of the BERYLCO package. Over a 30-year period, BERYLCO staffmen have grown with beryllium products and they can supply just the help you need in creating trouble-free applications. Find out now about the company with the brightest future in beryllium. Write today for our latest technical bulletin.

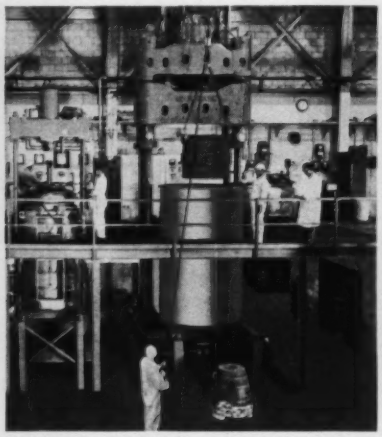
BERYLCO

THE BERYLLIUM CORPORATION

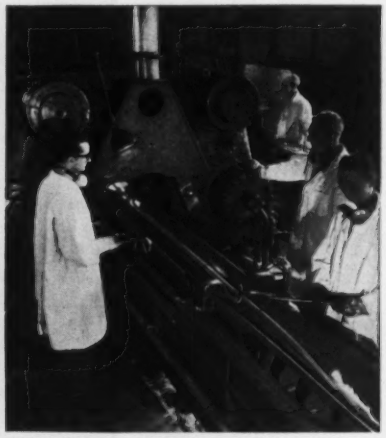
Reading, Pennsylvania



Extensive machining facilities at Berylco's Hazleton plant turn out precision beryllium metal components.



Various shapes and forms of beryllium metal are produced at Berylco by advanced powder metallurgy methods.



1700-ton Loewy hydro press at Berylco's Reading plant extrudes beryllium metal and alloys.

VERSATILE

Here's the do-everything drill press that zips through any job . . . from reaming, spot-facing and tapping to polishing and high speed drilling.

Infinitely variable speed range is from 120 to 1750 RPM . . . utilizing a two-speed motor with the famous Powermatic variable speed drive. This same high-low speed system (160 to 2100 RPM) available on step-pulley model.

Equally safe, dependable and accurate in line production or in the smallest job shop.

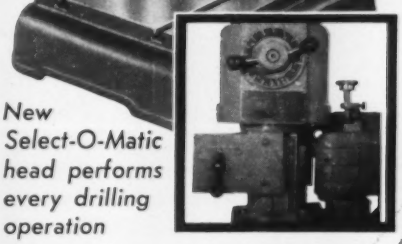
- **Mechanical or Hand Feed Models**
- **Floor or Bench Units**
- **Multiple Spindle Arrangements**
- **Micrometer Depth Gauge**
- **6-spline Spindle**

Model 1200 20" drill press

Model 87 20" Metal Cutting Band Saw

DIAL SPEED . . . CUT COSTS SAFELY!

Set speed from 40 to 4600 SFM while saw runs. Save stock change - over time. Ferrous and non-ferrous metals, wood, plastic and similar materials.



New Select-O-Matic head performs every drilling operation

Dealers in Principal Cities

POWERMATIC®
MACHINE COMPANY Dept. 6
McMinnville, Tennessee

BAND SAWS DRILL PRESSES GRINDERS AND FAMOUS WOODWORKING MACHINES

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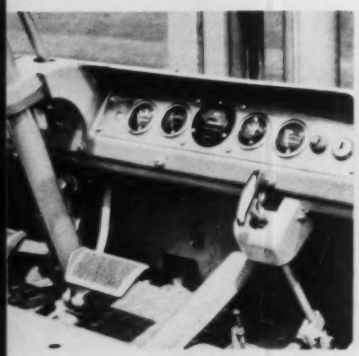
Fast, safe operation • centrally located controls • protected instrument panel • separated ignition key and starter switch • reinforced steering column bracket • automotive type inching, brake pedals.



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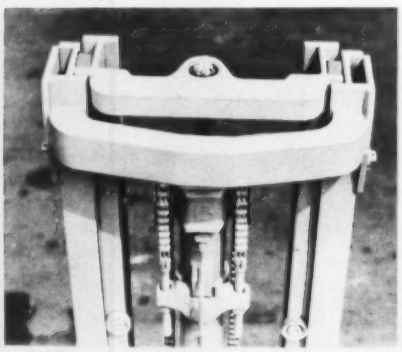

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How to Evaluate Cottrell Precipitators

How important is Precipitator Size?

A common fallacy assumes a larger precipitator with lower gas velocity is preferable to a smaller precipitator with higher gas velocity.

This assumption overlooks important economies now obtained with:

(a) Efficient voltage application

(b) Specific control of electrical sections

(c) Electrode design improvements

(d) Automatic Rapper Control

(e) Accurate internal baffling

(f) Proper control of gas flow, based on three-dimensional model studies

Close familiarity with these techniques and improvements has enabled us to guarantee 99% collection on large, modern installations.

Applied Voltage

Let's take Applied Voltage as a start. *If you double the operating voltage in a precipitator, it is equivalent to adding three times again as much collecting electrode area—or building a precipitator four times as big.*

If Applied Voltage is this important, how can evaluation engineers make sure a precipitator is operating with maximum voltage at all times?

Generally, the amount of arc-over in the precipitator determines the practical operating limit. Provision should be made in the precipitator's control to measure and integrate this arc-over so it can be used as the motivating factor in the control.

Stated simply, a precipitator must have control equipment which guarantees maximum voltage input regardless of changes in gas flow, particle size or resistivity, etc.

Sectionalization

Another important point in evaluating Applied Voltage is the question of how much sectionalization is provided in the specifications. Gas conditions are not constant throughout any precipitator. Higher efficiencies are obtained if the precipitator is divided into sections, each of which has its own voltage control set. In this way, maximum voltage is applied to each section regardless of variations in gas conditions from one section to another.

Reentrainment

Another factor affecting collection efficiency is the possibility of dust reentrainment. This refers to re-suspension of dust that has already been collected on the collecting electrodes.

Engineers are now demanding proof that collecting plate design provides correct baffling to shield the collecting surface against the sweeping and scouring effects of moving gas streams.

Precipitators using properly designed collecting electrodes can be 25% to 50% smaller than a precipitator using improperly designed electrodes. Once again, the emphasis is on proper design, not precipitator "size".

Proper Rapping

Another cause of reentrainment is improper rapping. A rapping blow that is too hard may dislodge too much collected dust and cause reentrainment. On the other hand, if the blow is too "soft", the dust builds up on the collecting electrodes, disrupts electrical conditions and necessitates reduced operating voltage.

As we said, conditions inside the precipitator are not constant. Gas flow, temperature particle size and resistivity are all constantly changing. Rapping intensity must also change to meet these varying conditions. This means that an evaluation engineer must be sure the rapping equipment specified is fully adjustable to meet all these changing conditions.

Sneakage

Now that collection efficiencies demanded by industry are becoming higher and higher, sneakage is an important consideration. This refers to that part of the gas stream which might sneak around the treatment zone.

Proper internal baffling is the only way to make sure that the entire gas stream flows through the treatment zone. For this, evaluation engineers must rely on the experience of the precipitator manufacturer in three dimensional model studies and research on full-scale precipitators.

Gas Flow Pattern

A major factor affecting the relationship between precipitator size and performance is the gas flow pattern across the face of the precipitator. When you consider the fact that proper flow can mean another 25% - 50% reduction in precipitator size, it pays to investigate the design elements affecting this gas flow pattern. Again, evaluation engineers should ask the manufacturer how he has provided for correct gas flow.

In this brief review we have been able to hit only a few high spots of precipitator evaluation. It is a complicated problem because of the many variables in gas conditions and the combinations of electrical, electronic and mechanical equipment involved.

If you want more information on any of the points discussed in this review, please contact your nearest Research-Cottrell representative or write us in Bound Brook, N. J. Our 48 years of gas cleaning experience are at your service.

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METALGRAMS

UNION CARBIDE METALS

. . . news of "Electromet" ferroalloys and metals

JANUARY, 1961

CLEANER STEELS-HIGHER QUALITY -- "Silicomanganese deoxidation in the furnace produced average cleanliness better than any other furnace practices tried," the 1957 Open Hearth Conference was told. The cleaner steel produced with silicomanganese additions has better surface quality and mechanical properties. Silicomanganese not only produces fewer inclusions, but also forms more desirable inclusion types. Other advantages: improved forging and rolling properties, lower conditioning costs, and increased mill yield.

* * *

DATA FAVOR SILICOMANGANESE -- Production data has shown that lowest scarfing costs are obtained with a heavy silicomanganese block. Silicomanganese also reduces hot shortness of some high-sulfur steels and generally improves the quality of other steels. Long internal seams that cause rejections in the finished product are also reduced with a silicomanganese block. Have your Union Carbide Metals representative show you how you can improve the quality of killed steels used for all applications. Also, ask for the article, "Silicomanganese Produces Cleaner Steels", in the Winter 1961 issue of UNION CARBIDE METALS REVIEW.

* * *

LOW COSTS WITH CHARGE CHROME -- In recent years, the use of charge chromes in stainless steel melting has increased markedly. The reason: they are the lowest-cost ferrochromes available. Union Carbide Metals offers three alloys with different chromium, carbon, and silicon contents to meet individual practices. UCM's studies using a high-speed computer have helped steelmakers select the charge chrome that will give lowest costs. Look to Union Carbide Metals for help on the most economical use of charge chrome alloys. For more information, write for the article, "Predicting Minimum Materials Cost for Stainless Steel", in the Spring 1959 issue of UNION CARBIDE METALS REVIEW.

* * *

WHY BUY AMERICAN? -- Ferroalloy imports doubled between 1955 and 1959. Steel, iron, and nonferrous imports are up sharply too! Foreign producers have low wage rates which enable them to compete on a price basis with the U. S. However, they cannot compete with U. S. producers on three counts: (1) valuable metallurgical assistance at a user's plant, (2) consistent quality in all materials, and (3) products delivered when the customer wants them. For further information, write for the article, "Why Buy American?", in the Fall 1960 issue of UNION CARBIDE METALS REVIEW.

* * *

MANGANESE IN ALUMINUM -- In binary alloys, manganese improves the strength of aluminum by 20 per cent with no sacrifice in corrosion resistance. Thus, 3000 series alloys (containing 1.25 per cent manganese) are good general-purpose alloys for storage tanks, piping, furniture, TV antennas, awnings and siding, and chemical equipment. Manganese is also added to 2000, 5000, and 6000 series alloys to improve corrosion resistance. UCM offers low-iron ferromanganese and "Elmang" electrolytic manganese for such additions. More information can be obtained by writing for the article, "Manganese Puts Muscle in Aluminum", in the Winter 1961 issue of UNION CARBIDE METALS REVIEW.

* * *

UNION CARBIDE METALS COMPANY, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. In Canada: Union Carbide Canada Ltd., Toronto.

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CHANGING PRODUCT PATTERNS IN STEEL may obscure some decisive market changes over the next few weeks. Auto demand has been the big prop under the market for the past six months. If steel operations remain stable or improve in February, in the face of sharp cutbacks due for auto tonnage, it will mean a general recovery is offsetting the auto lag.

ONE ANSWER TO THE PROBLEM OF PRICE SLASHING has been found by the fastener industry. Plagued with price warfare over the past year or more, fastener men about a month ago put through a 5 pct increase in prices. One fastener sales executive says the increase has firmed prices more than was expected.

ELECTRIC POWER ADDITIONS by this country over the next 20 years will equal the total output of the world today. Westinghouse Electric Corp. says bigger generating units will be built to meet new needs. Electric companies are already thinking in terms of generating and transmission systems up to 800,000 kilowatts, says Westinghouse.

PRODUCTION OF PLASTICS MATERIALS is forecast to rise by 5 to 10 pct this year compared with 1960. Last year's production, up 30 pct over 1959, is estimated at 6158 million lb by the Society of the Plastics Industry. New production highs have been made in each of the last nine years.

"INDUSTRY MUST AGAIN BECOME CUSTOMER-ORIENTED rather than factory-oriented," says J. S. Sayre, Norge Co. chairman. He feels this is the key to meeting marketing needs in the '60's.

A NEW EQUIPMENT FINANCING PLAN to aid equipment dealers is being pushed by one leasing company. Here's how it works: Say a dealer and his customer agree on a $7000 trade-in on a $15,000 new piece. The customer sells his used item to the leasing company for $7000 and leases the new piece. The leasing company pays the dealer the $15,000 and trades him the used item for $7000. The leasee-customer then has $7000 and his new equipment.

AIRCRAFT INDUSTRY SALES ARE EXPECTED TO RISE by 5 to 10 pct in 1961 over the past year. Larger military procurement of aircraft and missiles is expected to offset a drop in commercial jet sales. Sales estimates for 1960 run about $11 billion.

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Government Urged to Keep Out Of Future Steel Strikes

Report for Secretary of Labor Mitchell says probability of government intervention serves to prolong steel strikes.

Side effects of steel strikes are exaggerated, report states. Mr. Mitchell urges "mature bargaining" in future disputes.
By R. W. Crosby

■ The Government should keep hands off collective bargaining in the steel industry and let labor and management fight it out. This is the main bombshell in a salvo which fell on Washington in the form of the long-awaited report to Secretary of Labor James P. Mitchell on the basic steel industry.

The report, "Collective Bargaining in the Basic Steel Industry," runs the gamut of management, union, and government relations. It spares none of them.

MITCHELL'S REACTION: " . . . The parties to steel bargaining will have . . . to reckon with a much more sophisticated public, and with government policies which sternly place upon the parties their full responsibilities for mature bargaining and peaceful settlement . . . "

The Conclusions — Besides the fundamental recommendation urging the government not to intervene in labor-management negotiations, the report makes these unexpected points:

That Government has increased the conflict between labor and management negotiations.

That "large price increases in steel have only small effects upon the general price level of the economy." This is a bombshell that will shake the foundations of the anti-trust probings of Sen. Estes Kefauver.

That legislation to change the collective bargaining system will not help much in avoiding future steel strikes.

That effects of steel strikes are exaggerated. For instance, that secondary unemployment due to steel strikes has been overstated; that "high level pressure" from government may have been exaggerated in respect to settlements; that the national emergency interpretation of steel strikes has been exaggerated; and, generally, that the consequences to the public are overstressed.

That the steel industry should heed the warning of competition and look to lowering cost and improving quality.

These conclusions came after an exhaustive year-long study by Professor E. Robert Livernash, of Harvard University, one of the nation's experts on labor-management relations. It was at the request of Secretary Mitchell, during the 1959 steel strike, that Mr. Livernash undertook the study.

He was asked to study the way in which the collective bargaining process, and government intervention, had worked in the basic steel industry.

Hands Off — "Collective bargaining" came out of the study just about intact. But "government intervention" was torn almost to shreds.

Mr. Livernash and his staff reached the "hands off" recommendation through three basic conclusions. They found that past steel

Will Report Bring Changes?

The report says government intervention doesn't help settle steel strikes. Will the new Administration adopt this policy?

■ Professor Livernash's forthright conclusions on government's role in steel bargaining are no news to steel management. But they do even the score a little for the steel industry's side.

Not all those who helped with the report agree completely with the professor's conclusions. But by and large, there was little basic change made in the report after it was submitted to labor and management for comment. (See I. A., Oct. 27, 1960, p. 60.)

Trouble is, the study is logical. It will reach few men-on-the-street and will probably be read completely by few in management or in the union. Yet it is of a caliber of writing and sound reasoning not usually associated with labor studies sponsored by a government department.

The blunt assertion that intervention has hindered rather than helped settle steel strikes is significant. It brings up the question of whether this advice will be followed by Mr. Kennedy's administration. Arthur J. Goldberg, new Secretary of Labor, may convince Mr. Kennedy that joint boards made up of management, labor, and public members are the way to settlement of national strikes.

There is every reason to believe that this study will strengthen the conservative beliefs of such men as R. Conrad Cooper, U. S. Steel executive vice president and industry negotiator; Roger M. Blough, U. S. Steel chairman; Arthur Homer, Bethlehem Steel chairman, and others. They hold beliefs that a strong front, a sharp opposition to the union demands, and a drive for non-intervention and smaller wage increases are what is needed for industry.

Certainly it is interesting that academic people operating in an ivory tower — but with reports from the "outside"—finally came to this conclusion: The public could hardly care less about what happens in steel until such time as it is personally affected. And long before then, pressure on both steel labor and management will come from steel users.

There is also evidence that expensive public relations programs beamed at Joe Doakes may be a waste of money by both sides, according to the study findings.

Some steel officials will be "I-told-you-so-ing" for a long time. They have felt that the steel hassles and private bickering were far less the national crisis they were painted. Thus, it may be that the battle of the mimeograph machines with their "hot" press handouts will be a smaller factor in the next war of nerves.

But after all is read, talked about, and confirmed, it may be that the new Administration will assume that steel is basic, that intervention may be necessary, and that management must seek more placid ways to settle its disputes with the union. If the Administration thinks thusly, it will fly in the face of a report which, for the first time since the first steel contract was signed in 1937, gave the steel industry its just due.

Hidden in the fine print is a strong indication that mediation —such as that of Federal Mediator Joseph Finnegan and his able aides—will go much further than the hullabaloo of "top level" meetings, press release battles, and government attempts to pull union chestnuts from the fire.—**Tom Campbell.**

strikes have left no permanent scars on the nation's economy, and that steel settlements have had minimal effects on wages and prices in the economy.

These conclusions led to the third, that steel strikes mainly affect the parties, management and labor, and do not justify the public "consternation and outcry" which has occurred in the past. Therefore, formal and early government intervention is not warranted. In fact, Mr. Livernash says, "Government intervention has not prevented strikes."

The Alternate—What is an alternative to government intervention? The answer appears too simple. "By far the most constructive alternative is the achievement by the parties of a reduction in conflict," the author says.

But he goes further than this simple statement. He believes a minimum of government intervention will mean less conflict. Government intervention into price determination and into collective bargaining, he reports, "has been a source of conflict in and of itself."

The report points out that the anticipation of intervention modifies the approach of management and labor to negotiation. The reason is that "neither party wishes to weaken its position if intervention is probable." Thus, new conflicts enter the negotiations.

How It Goes Wrong — Typical early intervention by the government to avoid strikes has been by mediation or fact finding with recommendations. Neither has been effective. When a mediator may soon be sitting in with labor and management representatives, they are less apt to agree, according to Mr. Livernash. And the issue of accepting or rejecting recommendations has become a new source of conflict.

Adding further conflict, Mr. Livernash says, is the influence of government officials and their pronouncements on steel prices.

He believes the only form of intervention which has produced settlements in steel has been high lev-

el mediation. He notes it is aptly described as mediation "with a club." He adds:

"The significance of 'high-level pressure' may nevertheless have been exaggerated in respect to steel strike settlements. It would appear to be far less the pressure of high office than the pressure of circumstances upon the parties which creates the settlement."

Impact Exaggerated — The impact of steel strikes on the public, on the economy and on steel management and labor, themselves, seems to revolve around a mass of exaggerations.

One such exaggeration, though Mr. Livernash doesn't say it, appears to be the cry from antitrust people like Sen. Kefauver, that the steel industry can "administer prices" for the whole economy.

Without talking of administered prices, specifically, results of the study indicate the steel industry has been conforming to, rather than establishing major wage and price trends in the economy.

He says:

"Within a range of realistic discretion open to the parties in collective bargaining, and to the companies in the determination of prices, their decisions have hardly had a measurable effect upon the general price level."

The Costs — Mr. Livernash hastens to point out that the fact that strikes appear to have had no serious, permanent effects upon the economy does not imply that strikes have not resulted in extra costs to management and labor.

Other Effects — Two other serious effects of steel strikes are secondary unemployment, such as in transportation and mining, and the impact on national defense.

"As the strikes are prolonged and steel inventories depleted," Mr. Livernash reports, "production can also be curtailed in steel-using industries." However, he points out that the amount of secondary unemployment is believed to have been exaggerated.

He admits the impact of the strike on national defense is difficult to analyze. It is obvious a strike can adversely affect defense. But the effects are not the most crucial question. The crucial question is, should partial operation to meet defense needs during a strike be used?

Mr. Livernash thinks it should be used. He says: "If defense officials felt that a steel strike involved a threat to national security, it might be practical to keep open or reopen plants producing critical items." If this could not be done on a voluntary basis, he thinks it might be possible under present injunction procedures.

The impact of steel strikes on labor and management presents somewhat of a paradox. The report states that neither the companies nor the union want a strike.

The Causes — The natural question arises: Why have both strikes and intervention been so frequent in the past?

The answer by companies and the union would be to point the finger at each other, the report says. But Mr. Livernash thinks it goes deeper. The answer lies in the fact that steel strikes are industry-wide.

Unlike other industries, where the question might be, can one company afford a strike while its competition still operates, steel shuts down completely. This means less pressure to avoid a strike.

In addition, he writes, "The parties have not usually anticipated a long strike because of the national emergency characterization of strikes and consequent government intervention."

The Summary — Here are the conclusions:

"While the conclusions of this study indicate that the consequences of steel strikes to the public need not cause alarm and are typically exaggerated, the crisis atmosphere which is created can outweigh a logical appraisal.

"A succession of long steel strikes can easily lead to a political situation which demands drastic legislation. The consequences of such legislation are difficult to appraise, but they are not appealing because they substitute the uncertain consequences of public power for private responsibility."

The Man Behind The Report

E. Robert Livernash is professor of business administration, Graduate School, Harvard University.

He is one of the nation's experts on labor-management relations, and author of the book, "Impact of Collective Bargaining on Management."

Mr. Livernash did undergraduate work at the University of Colorado, received his Ph.D. at Harvard, and taught earlier at Tufts College.

Defense Buying Changes Asked

Useful Life of Product Is Key, Not Initial Cost

Industry and military leaders engaged in a round-table session at National Symposium on reliability and quality control.

High maintenance costs on defense items call for plan for manufacturers to service what they sell the government.
By J. D. Baxter

▪ "Do present procurement practices promote the delivery of unreliable equipment to the government?"

This was the question tackled by a panel of top military and industrial leaders at the seventh National Symposium on Reliability and Quality Control in Philadelphia last week.

The grudging admission of both the military and industry panelists to the question: "Yes, in many cases."

At the heart of the problem: The increasing complexity of military hardware. Product and systems complexity is moving faster than reliability systems and procurement practices.

Electronic Interest—The round-table session was a highlight of the multi-sponsored symposium. Sponsoring organizations were the American Society for Quality Control, Institute of Radio Engineers, American Institute of Electrical Engineers, and Electronic Industries Assn. The primary area of interest to the group meeting was the electronics field.

Panel moderator, W. A. MacDonald, board chairman of the Hazeltine Corp., called for stress in government buying on "useful life" values rather than on initial costs. He contends that the significant costs in the defense systems picture are in maintenance and support.

Mr. MacDonald showed that Defense Dept. expenditures for electronic equipment in 1959 totaled $5.935 billion. Of this, $4.175 billion was spent for product procurement, $890 million for operating and maintenance costs, and $870 million for R&D and test and evaluation.

Little Left—Of the amount spent on product procurement, 10 pct was spent for product development, 30 pct on support equipment and 30 pct for spare parts. "Thus," said Mr. MacDonald, "only 30 pct—some $1.4 billion—of our production procurement expenditures went into actual new weapons hardware."

Mr. MacDonald claims that maintenance costs for electronic military equipment runs 6 to 20 times greater than for commercial electronic equipment.

E. V. Huggins, vice president of Westinghouse Electric Corp., agreed with Mr. MacDonald, and suggested "integrated buying" by the govern-

Objective: More for the Defense Dollar

Industry Leaders Recommend:

1. **Shift emphasis in buying military hardware from "initial cost" considerations to "useful life" values.**
2. **Integrate buying of products and services from a single source. Manufacturers should be responsible for maintenance of what they sell.**
3. **Make greater use of incentive contracts. Contractors should be rewarded for exceeding product and cost performance goals.**

Military Leaders Answer:

1. **Most procurement (86.6 pct) is "negotiated" buying, not competitive bid. This means less awards are made on "lowest initial price."**
2. **Limited appropriations covering any one period often prevent ordering both the product and the service on the product at one time.**
3. **Most contracts have incentive "clauses," and these serve well in the absence of wider use of incentive contracts.**

ment. Mr. Huggins believes government buyers should procure both the hardware and the maintenance service from the same industrial source. He cited the way elevators are bought from his company by building operators.

Integrated Buying—"These men are not buying a product," said Mr. Huggins. "They are buying a function — vertical transportation. So they buy both elevator and service from the manufacturer of the equipment. They are looking for continuing performance of the function of serving people in their buildings."

W. W. Watts, Radio Corp. of America vice president, called for more incentive contracts as a spur to lower procurement costs and increased reliability.

Military Answers—Military members of the panel pointed out that many of the suggestions made by the industry spokesmen are already being pushed by the government.

Major General W. A. Davis, commander, Air Materiel Command, Aero Systems Center, and Rear Admiral L. D. Coates, Navy director of development and planning, led the "rebuttal" to industry.

Adm. Coates pointed out that buying product and service from the same source is usually impossible under present appropriation methods. Products are bought from current funds, and maintenance needs from future funds after products have been put in use in the field. There is not enough money in "one pot" to buy both at the same time.

Disputes Cost Claims — General Davis disputed high maintenance and support cost claims. Comparisons with civilian electronic goods are impossible, he said. He noted, also, that the Air Force "negotiates" more contracts than it awards through open bidding. In negotiated buying, he explained, reliability, not cost, gets prime attention.

General Davis also pointed out that while incentive contracts, as such, may not be too often used, still most contracts included incentive "clauses."

Processors Fight Sales Tax Levy

Pinched for revenue, tax men in Pennsylvania say cold-rollers must pay a 4 pct sales tax on many purchases thought exempt.

They contend exemptions apply only to "manufacturers."
By G. J. McManus

■ Pennsylvania's spreading sales tax threatens steel mills and others with new cost burdens in the near future.

State tax people contend the sales levy must be paid on many plant purchases that were thought to be covered by the manufacturers' exemption of the tax code.

For example, non-integrated producers of cold-rolled strip are most drastically affected by recent rulings. Six of these are now appealing a decision that they are not to be classed as manufacturers at all. On this basis, the state is demanding that the six mills pay sales taxes on a wide range of production and maintenance purchases.

Industries Affected — Pennsylvania's big integrated mills are also being pressed for sales tax dollars. In these situations, the state contends certain operations within the mills are not manufacturing. Purchases for these operations should carry a sales tax, the state argues.

The liability of large mills in this matter will probably be hammered out with tax administrators by negotiation. Actions involving scrap dealers, platers and heat treaters have already been taken to the courts.

In the case of non-integrated mills, tax men say there is nothing to negotiate. The entire cold-rolling operation is outside the manufacturing field, says the state; practically all purchases for the operation are taxable.

With Interest — The companies will seek to reverse this finding Feb. 13 in a court of common pleas at Harrisburg, Pa. If they lose, the mills will be hit with heavy charges. Pennsylvania's sales tax is now 4 pct. One relatively small producer estimates past taxes (with interest) will add up to $100,000.

Hot bands would not be taxed because they are bought for resale. But production equipment, fork lift trucks, replacement parts and practically everything else could be declared taxable.

Does It Change—Moreover, the state could use the same approach in applying other taxes. Having established that cold-finishers are not manufacturers, revenuers could sock companies with the capital stock tax. This amounts to a property tax on the net worth of a company. It carries a manufacturers' exemption with more restrictive wording than that for the sales tax.

Basic premise of the state in its move against strip mills is that cold rolling does not really change the product in question. Steel is still steel, say the tax men, whether hot- or cold-rolled.

Depart From Tradition — The lawyers say the whole action departs from traditional tax policies in several respects. The original idea of sales taxation was that you hit end products only. Taxes at the manufacturing point would mean a duplication and pyramiding of costs.

But with states pinched for revenue, the tendency has been to look for more sales to tax.

According to one lawyer, consumption has been the criterion in past cases. If a purchased item is actually consumed in the manufacturing process, it is considered exempt from sales tax.

Automakers Preview the Future

SAE Show Highlights Transit Prospects

What's probably coming in transportation was featured in displays at auto engineering exposition.

Among the prospects: Rapid transit systems, and new methods of powering cars.
By A. E. Fleming

■ Detroit looked into the future last week at the First International Congress and Exposition of Automotive Engineering.

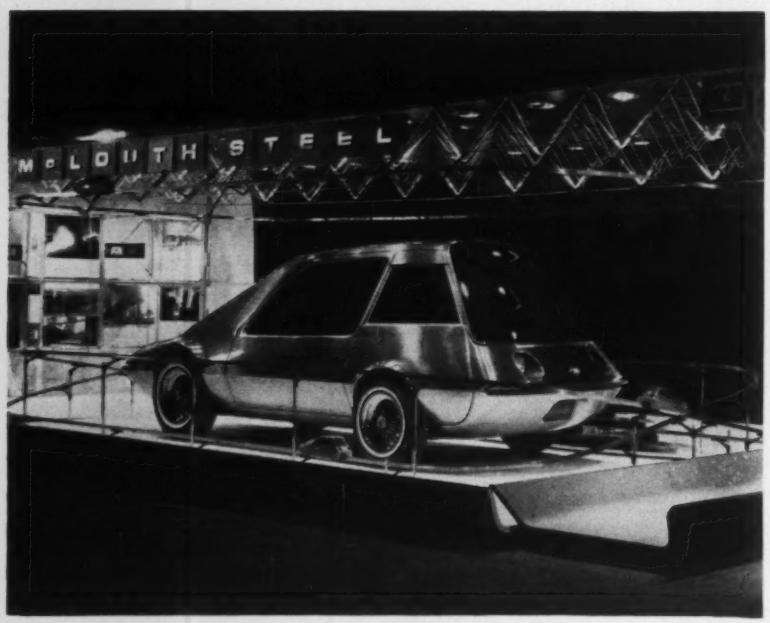
The future, as displayed at this event sponsored by the Society of Automotive Engineers, is a place of great rapid transit systems, revolutionary new car powering means and improved metals, plastics and other materials that might be joined to form a vehicle.

Combinations Planned—Some of the ideas may be just dreams. But many of them are given every chance of turning into reality, even before the 1970's.

Possibly because every metropolitan area in America is now facing transportation jam-ups, there was a lot of interest in transit systems combining elements of autos, planes, and monorails.

Much attention was gained by an elevated monorail rapid transit system with vehicles running on rubber tires for quietness and speed, and needing little superstructure for the overhead track.

McLouth Steel Corp. showed a four-passenger stainless steel vehicle which would run like a car in the streets, but could be carried on a monorail. (See photo.) The advantage: After a long, fast trip, the traveler would have his personal car with him.



ON OR OFF THE HIGHWAY: Model shown at recent SAE exposition in Detroit is the XV'61, a combination four-passenger, stainless steel car which can be driven on the road, or carried on monorail system. Designer of the unique vehicle is the McLouth Steel Corp.

"Automatic" Expressways—General Motors Corp.'s researchers have come up with "Autoline," an expressway where cars, guided by automatic controls, can run 150 mph bumper to bumper. GM claims the concept could be brought to the prototype stage in two years and into actual operation in ten.

J. C. Wagner of International Harvester Co., says 100-ft long truck trains, running between metropolitan terminals, will be sharing super highways with cars. He bases this on success of double-bottom turnpike rigs now in experimental use in several states. He says the gas turbine and advanced diesel designs are prime candidates to power the truck train.

Mr. Wagner also notes a design trend toward small tractors and compact trailers that will help fight heavy traffic in central cities. "Much interest is being shown in small electric runabout-type vehicles for light merchandise delivery," he says. "Small gas turbines used as driving generators might supply power to the wheels through cables to electric motors."

Interest in Electrics—According to H. C. Riggs, Electric Storage Battery Co., Philadelphia, revived interest in electric cars comes partly from development of lightweight materials and a 50 per cent rise in storage battery output in the last six years. He says it may be some time before fuel cells are used as a vehicle power source.

W. S. Herbert, acting director of research for the company, calls fuel cells an extension of battery applications, not a replacement. He says they're just another battery capable of long sustained discharge periods.

"Breakerless" Ignition — Also featured was a "breakerless" ignition system of General Motors Corp.'s Delco-Remy Div. It will do

away with contact points and condensers. The system is under study for trucks and tractors, according to H. H. Hartzell, D-R chief engineer. He says high volume use in cars depends on cost cutting. Using a pulse-controlled transistorized system, the unit would eliminate wear and pitting that results in replacement of contact points in conventional distributors.

If the fuel cell comes into its own will it bring a change in car design? It will, according to Brooks Stevens, industrial designer. He says the cells might be housed in wall thicknesses of the body shell, eliminating problems of transmission humps.

Mr. Stevens says, "The automobile of tomorrow can base its architecture on a desirable wheel tread and wheelbase for six or nine passengers. Body-and-frame or unit body construction are both applicable. New materials and their method of fabrication need not be based on present day realities."

"Lightweight materials, plastics —both transparent and opaque— will combine with equally advanced interior materials for seating and trim. All will be possible in a breakthrough approach to the fuel cell."

Show visitors were offered a look at the Wankel rotary combustion engine, which some say may be the next big revolution in car powering. A 100 hp, cast iron model weighing 150 lb was shown. Rights to develop and produce the engine are owned by Curtiss-Wright Corp.

Adhesive Prospects—Looking into the possibility of new uses of adhesives by auto makers, Minnesota Mining & Manufacturing Co., visualizes great strides based on several "ifs" — If plastic radiator reservoir tanks replace metal tanks; if aluminum engine blocks are made of several simple castings and bonded into one complex form; if frames for bodies are ever made of magnesium, plastics, or aluminum; if honeycomb sandwich construction is ever used for doors and body sections; and if thinner or lighter sheet metal is used.

How to Reduce Research Costs

■ "For just a few dollars we got the results of hundreds of thousands of dollars worth of research."

This is the typical reaction of a manufacturer who went to the U. S. Dept. of Commerce's Office of Technical Services for help. The OTS, first established at the end of World War II, is the government's clearing house for technical information.

Expanding Field—The amount of material it handles is impressive. (For examples, see box below.) The dollar volume of government-sponsored research is now about five times greater than in 1945, the peak year of World War II.

It's the function of the OTS to make as much of this information as can be released available to industry. And OTS reports have proved a valuable aid to many companies, large and small. They have helped these companies in developing new products and processes, making technological advances, and in avoiding the waste of duplicating research already completed.

Testimonials—Recently the Commerce Dept. asked some of the companies using OTS reports how they have been useful. Here, as furnished by OTS, are some of the replies:

"Use of the reports saved us at least three engineering man-months or about $6000. In addition, it permitted more economic use of available market research manpower, making a total minimum value of at least $10,000."

Avoids Duplication—The specific benefits reported by users are many. One company obtained two reports from OTS on a metallurgical process developed by the Navy. The firm estimates it saved $20,000 to $25,000 in research. By spending $2500 the company was able to adapt the process to its own use.

What OTS Can Supply

A wealth of technical information is available, at nominal cost, through the Office of Technical Services, U.S. Dept. of Commerce. Here is some of the material offered:

Research Reports: A monthly publication announcing, indexing, and abstracting newly released reports of government or government-sponsored research.

Technical Newsletter: Designed especially for small and medium-sized companies. Published monthly, it digests technical reports of special interest to these companies.

Selected Bibliographies: Lists in many special areas of interest, such as welding, transistors, beryllium, abrasives, etc. are compiled and printed for sale.

Patent Abstracts: This series abstracts government-owned patents, which may be licensed on a non-exclusive, royalty-free basis.

Technical Translations: Lists and abstracts translated technical literature from non-government sources, foreign and domestic, as well as collected translations from both U.S. and foreign government sources.

Gold Crisis—Kill the Golden Goose?

■ If some of the sloppy thinking about the U. S. gold "crisis" is translated into action it will mean trouble for many top-notch metalworking companies.

If this seems far-fetched, let's note two points: (1) Our economy does not operate in a vacuum—what happens in one area affects all others; and (2) U. S. metalworkers are continuing to add to their already substantial investments abroad.

In general—This overseas investment is good for the whole U. S. economy. But there are rumblings which could wind up in steps to restrict such investment: (1) Bills have been drawn further to penalize it; (2) although American Motors president George Romney has withdrawn his blast at General Motors, his opinions are widely held; (3) labor leaders sounded off at Ford even before its British purchase; and (4) unless the new President alters the ruling on U. S. overseas service families, the armed forces lobby will demand other restrictions on gold flow.

In a nutshell, the "gold crisis" —if it is a crisis—is due to our sending more money out of the country than we get back.

Where Do We Stand?—The U. S. has a favorable balance of trade, but an unfavorable balance of payments. (A "favorable" balance is when you take in more than you put out). The favorable balance of trade for 1960 was about $4 billion; we exported some $19 billion worth of goods but imported only $15 billion worth.

But our balance of payments was unfavorable because of the dollars sent abroad for investment, tourism, foreign aid and to keep U. S. forces overseas.

Rob Peter, Pay Paul—This is not the place to consider all the proposed solutions to that problem. But trying to solve it by penalizing U. S. companies who wish to invest abroad is stupid.

The usual charge against such companies is that they are exporting jobs. Most of the best known U. S. machine tool builders now have European connections. How can these people be accused of exporting jobs they couldn't get?

What Jobs?—Take the case of a U. S. machine tool builder whose price in Europe or South America is 35 to 40 pct above a roughly comparable European tool. He offers more rigidity, more power, more high-production experience. Still, the price differential is too much. But by manufacturing or licensing in Europe he exports know-how—and gets paid for it. The annual income from this and other U. S. foreign investments is now beginning to approach the amount we invest abroad each year.

As Harvey Williams, president of Philco International Corp., put it recently, "The value of these investments is a great international asset. In fact, our overseas investments, dollar for dollar, are probably much more important to us than our gold holdings for two reasons. First, these investments are continually increasing in value through the reinvestment abroad of profits which they earn. Consequently, their true value is not adequately measured by the cumulative outflow of private investment funds from this country.

A Second Point—"These overseas investments are income-producing — something which cannot be said of the gold buried at Fort Knox, Mr. Williams notes. Commerce Dept. estimates indicate that earnings on investments abroad, after taxes, may average something better than 10 pct and that perhaps half of these earnings are paid out in dividends. . . ."

Let's keep the "gold crisis" in perspective. Only a few years ago we held nearly $23 billion in gold. That was as late as 1957; the rest of the world was crying about a "dollar" shortage; U. S. exports were limping. Today we hold about $17.7 billion; we are worrying about a "gold" shortage; U. S. exports are booming.

Crisis Ahead? — Perhaps we have a serious gold crisis in the making. Some astute financial people feel that we do. There are others who say that the balance could swing the other way within a few years. All agree that nothing should be done now to undermine confidence in the dollar. And restricting U. S. overseas investment would be in the latter category.

Mr. Williams, whose remarks were directed to an international session of the Philadelphia Chamber of Commerce, made another vital point: If the U. S. Treasury took a more realistic outlook on the taxation and reinvestment abroad of overseas profits, the income returning to the U. S. from overseas operations would be a lot higher.

Double Tax—U. S. earnings abroad are taxed twice; once overseas, once here. If you want dollars to flow back you ease up on the double taxation. Tightening up the flow-back would make the gold problem worse, not better.—**G. F. Sullivan.**

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Better Days Ahead in Scrap?

Not Immediately, But Long-Term Research May Pay

Scrapmen attending the recent ISIS annual convention in Miami Beach aren't counting on much better days in the near future.

But they have hopes that long-term research and modernization will pay off.

▪ Violent winds and rain made a gloomy place of Miami Beach last week as scrapmen met there for the annual convention of the Institute of Scrap Iron & Steel.

As they looked out over the rain-drenched pool, most of the scrapmen pondered a similar outlook: Things would have to get better. But, in the meantime, better days were not easily forecast.

First, there's no early end in sight to the steel industry's recession.

Second, the industry continues to use a much larger charge of hot metal—at the expense of scrap.

As Milton K. Mahler, Institute president, put it, "Hot metal is our competitor. . . . The great impact of technological advances has made it possible for the mills to use more hot metal and less scrap."

Good Returns—In the long-term, the Institute's efforts, in which they are joined by the American Iron & Steel Institute, to research the industry, produce authentic data and factual evidence of the worth of scrap, should pay good returns.

But the short-term outlook was as gloomy as the overcast skies above the wind-swept beach.

Many in the scrap industry believe the only answer is modernizing their equipment. Many dealers are taking big steps in this direction. This is particularly important in "manufacturing" the industry's bread-and-butter product, No. 2 bundles.

Attitude Indicators—In response to some checks around the industry, here are some indications of the new attitude:

Frederick Rapoport, Alport Scrap and Salvage Co., Detroit, says, "Now that steel mills have loosened the bonds that have tied them to the vagaries of the scrap market, it is incumbent upon scrap processors to make every attempt to re-establish their position as a vital raw material supplier in the steel-making process.

"We must produce a product that is competitive both in price and quality with the new methods. Scrap iron is too vital a raw material to lie fallow."

But the trend to automation of scrap yards is a costly one. Many new machines and equipment for scrap operations will cost $200,000. For some major units, the costs can go around $1 million.

A survey conducted by the Institute shows that 93 hydraulic shears are now installed in U. S. yards. Another 25 are expected to be installed soon. These shears are bought at an average cost of $250,000.

Shear Interest—It's worth noting that at the Miami convention, the session on shears brought the highest attendance and interest of any seminar.

In addition to shears, scrap men are pouring money into incinerators, and scrap-handling devices such as balers, cranes, magnets and presses.

"This trend has been speeded up in an attempt to solve growing problems that beset the entire scrap industry. These include keener competition, rising labor costs, and the need to increase volume to lower unit cost." This is the opinion of Nathan Rose, president of General Iron Industries.

FUTURE AT STAKE: A big factor in ISIS plans is improving and standardizing No. 2 bundle quality. The theory: A small improvement in quality can greatly increase mill purchases. Here a car destined to become a prime No. 2 bundle is picked up at Detroit's Alport Scrap and Salvage Co.

Reynolds' Hot Line Starts to Roll

What Reynolds Metals Co. calls "the world's widest aluminum coiled sheet and plate" is now being produced at its Sheffield, Ala., alloys plant.

Plant manager D. H. Hipp says both the 170-in. reversing mill, which heads up the new line, and the four-strand 120-in. continuous strip mill are the widest aluminum rolling mills in the world.

Between these two mills in location is a 130-in. reversing mill "for increased production efficiency."

The three mills were built by United Engineering Co. of Pittsburgh to specifications by the Reynolds production and engineering staffs.

The 170-in. mill can produce plate up to 165 in. wide, and the 120-in. strip mill can produce coils up to 115 in. wide before trimming, according to Mr. Hipp.

Billingsley Named To Commerce Post

John S. Billingsley, a former official of the Crucible Steel Co., has been named the new Director of the Iron and Steel Division, Business and Defense Services Administration, Dept. of Commerce.

Mr. Billingsley, who replaces Carl Messinger, retired as assistant to vice president of sales at Crucible in August. He had been associated with the steel company for 37 years.

He is a member of the American Iron and Steel Institute, the American Society of Metals and the American Ordnance Society.

Will Kennedy Hold Budget in Balance?

Dwight D. Eisenhower is leaving John F. Kennedy the legacy of a balanced budget for 1962. Ike's budget of $80.9 billion with a predicted $1.5 billion surplus was handed to Congress this week.

Ike's budget, for the fiscal year ending June 30, 1962, is a contradiction of the view expressed by Mr. Kennedy's budget advisers. They predict deficit spending will be needed to cope with the slumping U. S. economy.

Deficit Spending Likely—In the end, it undoubtedly will be the Kennedy-budget view which will prevail. Ike's last budget is more a starting point for President-elect Kennedy than an end in itself. The new president will make major changes in the Eisenhower budget. But the new president will also let some of Ike's spending plans stand.

Major changes in defense spending and Federal aid programs are inevitable. Ike's plans for such things as taxation and civilian space spending probably will remain constant.

Defense Outlook—The new defense budget calls for a record peacetime outlay of $42.9 billion, an increase of $1.4 billion over this year's estimates. But it falls a billion short of what armed forces officials think they need. Mr. Kennedy is expected to hike defense spending at least that much.

Heavy emphasis in Ike's budget is on intercontinental missiles and modernized weapons.

On taxation, Ike will seek and the new president will follow through on an extension of the present 52 pct corporate tax rate and existing excise tax rates. All are scheduled by law to expire June 30.

Ike calls for tax reforms. Mr. Kennedy will agree. The budget singles out depreciation allowances as in particular need for review. Ike told Congress: "More liberal and flexible depreciation can make a major contribution toward neutralizing the deterrent effects of high tax rates on investment."

Particularly important points in the budget:

International Affairs — Greater volume of loans for the development loan fund and expansion of activities in Latin America and Africa is sought.

Space Technology—Supplemental funds for 1961 and more funds for 1962 for the development of satellites for commercial use. Ike urges private industry to participate in the development phase and assume the cost of the satellites.

Commerce—Ike's plans for area redevelopment and better operation of Federal regulatory agencies will be too mild for Kennedy. Ike does back antitrust legislation requiring large businesses to notify agencies of proposed mergers. Plans for continuation of the present export expansion program should stand the test of the change of White House occupants.

Absorbing the Jobless

The big drop in aircraft employment on the West Coast continues. In 1960, alone, 30,000 workers lost their jobs.

What happened to them? Fortunately for them and the West Coast economy, they find work in other fields.

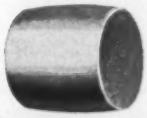
The booming electronics industry absorbs a good percentage. Here's an example. Hughes Aircraft Co. is basically an electronics firm. But it's not looking only for engineers.

The company needs sheet metal assembly workers, machine operators, and all types of metalworkers. During this year, its Fullerton, Calif., division alone will hire more than 2500 workers.

When selecting roller bearing pillow blocks, remember

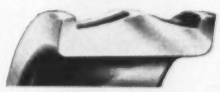
it's what's inside that counts!

MAXIMUM SIZE AND NUMBER OF ROLLERS for highest capacity



CENTRIFUGALLY CAST, PRECISION MACHINED BRONZE RETAINERS for smooth, quiet operation

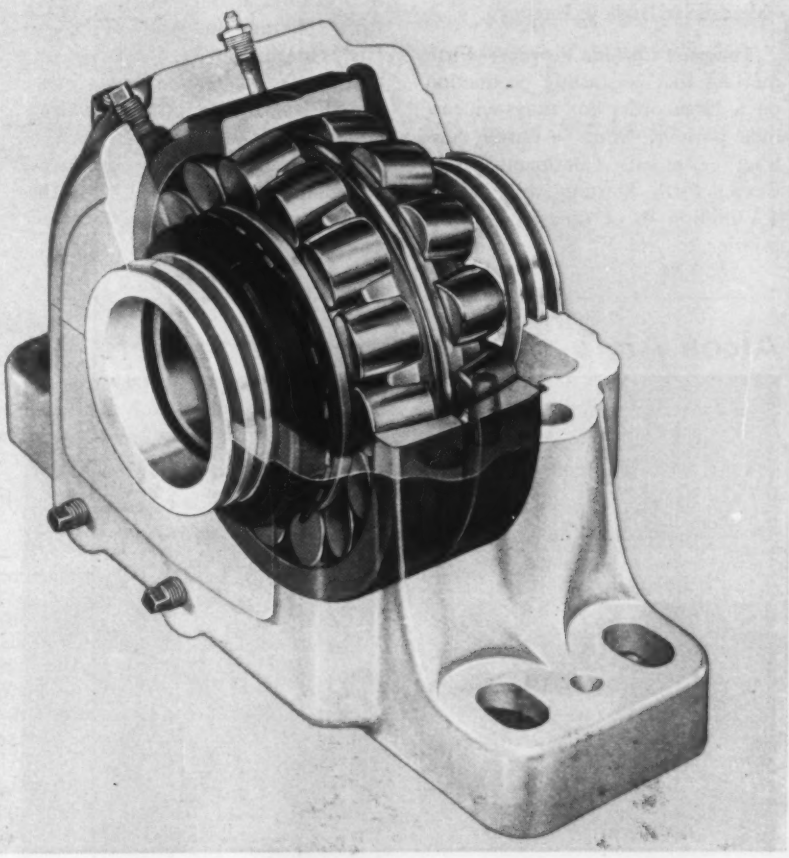
HIGH, HEAVY INNER RING FLANGES for ease of installation and removal



AND INSIDE LINK-BELT ROLLER BEARING BLOCKS you'll find Link-Belt's new spherical roller bearings . . . with big, mirror-smooth, highest capacity rollers; centrifugally cast, precision machined bronze retainers; heavy, broad-shouldered inner rings. *All* the best features of modern bearing design compactly unitized for utmost economy and long service life.

Link-Belt spherical roller bearing pillow blocks are self-aligning. Available in adapter mounting and direct-shaft mounting types for shafts from $1\frac{7}{16}$" to 12". Choice of two effective seals: all-purpose steel, multi-labyrinth seals, or Dacron-contact seals.

For full details, call your nearest Link-Belt office or authorized stock-carrying distributor. Look under BEARINGS in the yellow pages of your telephone directory. Ask for Book 2760.



SERIES 6800, 6900, 7800, 7900 have exceptionally rugged, two piece housings—machined as two perfectly matched parts providing easy installation.

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SELF-ALIGNING BALL AND ROLLER BEARINGS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney) Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15,414

INDUSTRIAL BRIEFS

Modern Arrowhead — A new plant will soon be built for the Federal - Mogul - Bower Bearings, Inc., aircraft-missile components division. The first unit of the new Arrowhead Products Div. plant at Los Alamitos, Calif. will itself amount to nearly 50 pct increase in floor space over the present Long Beach, Calif. facility. Operations and employees will be transferred to the new plant when completed next September 1.

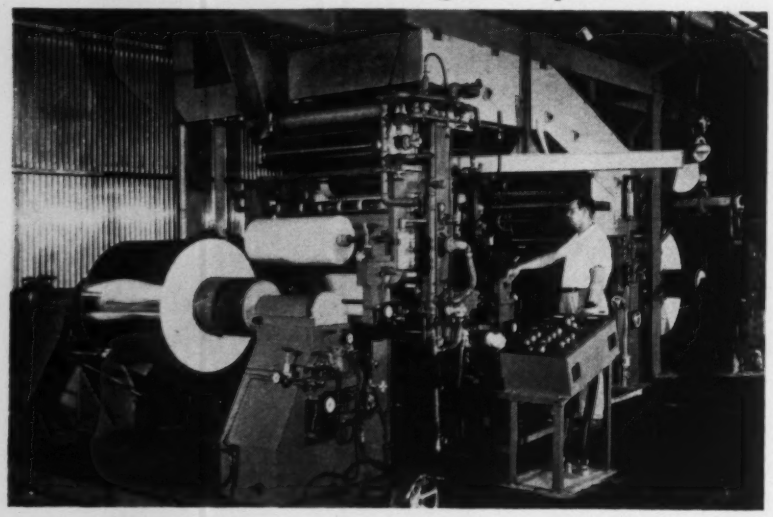
Dies in England — Oberg Mfg. Co., Inc., Freeport, Pa., manufacturers of carbide dies, has formed a partnership with Joseph Sankey Co., Ltd., London. The new company, Oberg-Sankey, Ltd., will service foreign markets and produce carbide dies at Dudley, England.

Tungsten Carbide Powder—Firth Sterling Inc. is starting production on a large order for tungsten carbide powder. Under a barter contract awarded Continental Ore Corp., Firth Sterling will deliver 1.1 million lb of tungsten carbide powder to the U. S. Government Supplemental Stockpile. Material will be produced by Firth's carbide division over the next 22 months from South Korean raw materials to be provided by Continental.

In The Adirondacks—Republic Steel Corp.'s Port Henry District (N. Y.) and Chateaugay District (N. Y.) iron ore mine operations has been consolidated into a single district. It is now known as the Adirondack District. The combining of the districts was necessary to insure the most efficient and economical operation of the mines as soon as steel market conditions warrant their reopening. Both mines are presently shut down as a result of the current reduced demand for basic steel.

Hot Rod Lab—A new $200,000 welding laboratory has been placed in operation at International Nickel Co.'s Huntington Alloy Products Div., Huntington, W. Va. Construction of 4000-sq ft facility was completed last month and specialized equipment is now being installed. A major part of the research to be conducted at the lab will be in the nuclear power field for both industry and national defense.

Alcoa Aims at Outfoiling Competitors



LAMINATIONS: New wax laminator at Aluminum Co. of America's Davenport, Ia., works is part of a $1.5 million expansion program there to establish the company as a major source of unprinted aluminum foil laminations for packaging, labeling, and other industries.

Billions for Research—An increase of more than $1 billion in Defense Dept. spending for research and development in 1961 is foreseen by a military electronics official of Minneapolis - Honeywell Regulator Co. S. F. Keating, Honeywell vice president—Military Products Group, estimated total defense spending for research development in '61 will be about $4 billion, with a steady expansion to about $7 billion by 1965.

Four-High and Rolling — Fairmont Aluminum Co., Fairmont, W. Va., is installing a new single-stand, 77-in. four-high rolling mill and a two-stand, 77-in. four-high tandem mill. The rolling mills, built by Loewy-Hydropress, are designed to increase the variety and size of aluminum sheet and to speed output. This machinery is part of a $10 million expansion program.

Sale Extended—A uranium concentrate purchase contract between the Atomic Energy Commission and Susquehanna - Western, Inc., has been extended to Dec. 31, 1966. The government will buy uranium concentrates valued at a total of about $47 million over the life of the contract. S-W is a subsidiary of The Susquehanna Corp., Chicago, operators of a 500-ton-a-day processing plant at Riverton, Wyo.

Bay Casting—Wellman Bronze & Aluminum Co., Cleveland, has arranged to lease and operate Dow Chemical Co.'s Sand and Permanent Mold Foundry at Bay City, Mich. Wellman, producers of magnesium and aluminum castings, will continue similar operations at the Dow plant. Dow said the move was made to remove the company from competition with other foundries which are customers for magnesium ingot.

Drawing South—Hackney Mfg. Corp., a Birmingham metal fabricating company, has completed a 15,000 sq ft building to be used as a wire drawing department. This is a new operation for the company.

NEW Allen-Bradley Relay with EXCLUSIVE Permanent Magnet Latching

Saves Panel Space

Gives Millions of Trouble Free Operations

Holds Closed Without Coil Current

Two to Six Poles

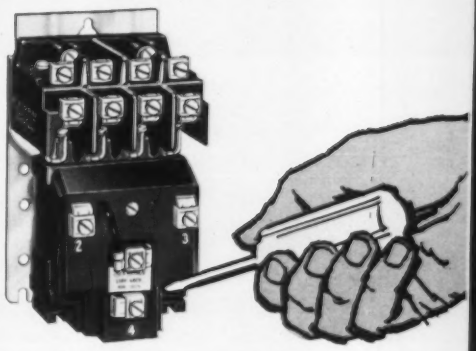
Bulletin 700 TYPE BRM

Here's a completely new "latching" relay—which does not use a mechanical latch! It is the Bulletin 700 Type BRM—built to provide the same millions of dependable operations you get from all Allen-Bradley's industrial relays. A "built-in" permanent magnet eliminates the mechanical latch and the usual troubles caused by mechanical linkages.

When the coil of the new Bulletin 700 Type BRM relay is energized, the relay closes and is held closed after the coil circuit is opened—by a permanent magnet. Energizing the coil in opposition to the permanent magnet field opens the relay. The correct polarity for operation of the relay is obtained from silicon diodes held within the molded coil cover. With no "piggy-back" additions out in front, and no "extra" solenoids below, the Type BRM relay saves valuable panel space.

These A-B Type BRM relays also feature a continuous duty coil that permits the current to be left on, if desired. As with all Allen-Bradley relays, the double break, silver contacts never need attention. And the contacts of these new magnetically latched relays afford the same 60-second convertibility of the popular Bulletin 700 Type BR relay.

For latching relay service, it will pay you to investigate this new and completely different relay. It provides the usual Allen-Bradley quality!



Can be latched or unlatched by hand

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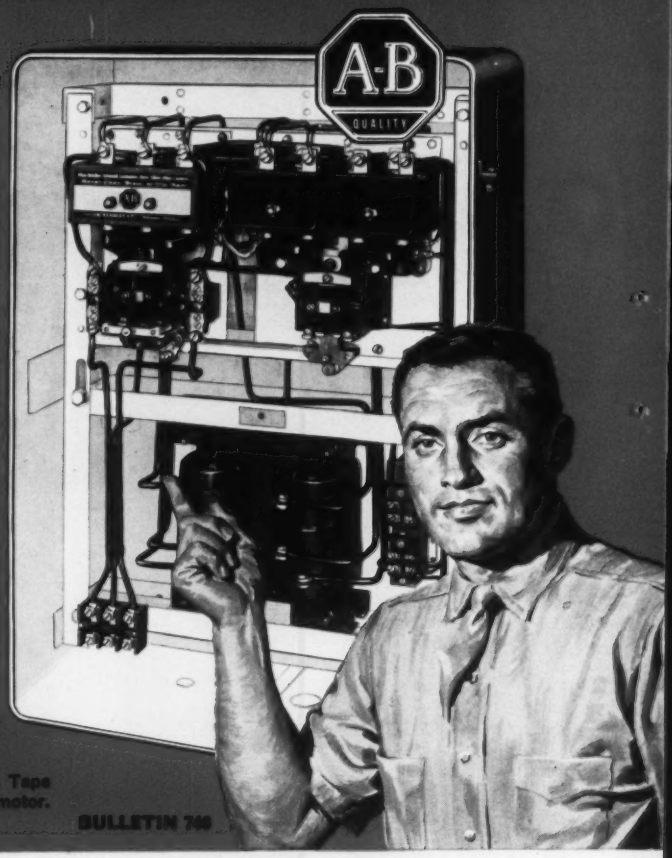
Where Reduced Voltage Motor Starting is Necessary...

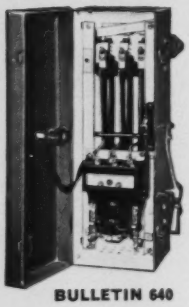
Allen-Bradley has the best and most complete answer

No matter what your reason for reduced voltage motor starting may be, Allen-Bradley has the *right* starter. Not only can the power company's requirements be satisfied exactly, but the A-B starter will at the same time provide the best possible starting conditions for the motor and the driven load. At least one of the starters described below will completely satisfy your operating requirements. For more detailed information, send for Publication 6088.



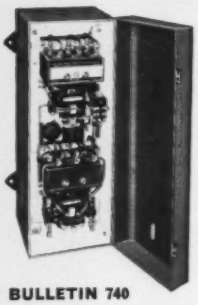
AUTOMATIC AUTOTRANSFORMER starter for squirrel cage motors that should not be started at full voltage. The autotransformer reduces line voltage during acceleration. Taps permit adjustment of voltage applied to the motor.

BULLETIN 748



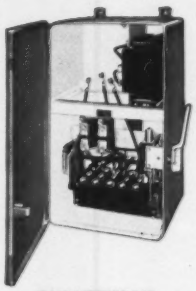
MANUAL STEPLESS RESISTANCE starter has graphite compression disc resistors for velvet smooth starting of squirrel cage motors. Starting of the motor is under the complete control of the operator.

BULLETIN 640



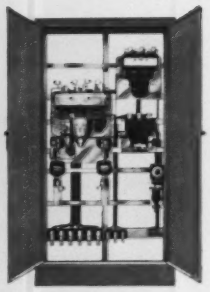
AUTOMATIC RESISTANCE starter has graphite resistors automatically inserted in series with the squirrel cage motor at starting. Resistors can easily be adjusted to motor and load conditions, giving velvet smooth acceleration.

BULLETIN 740



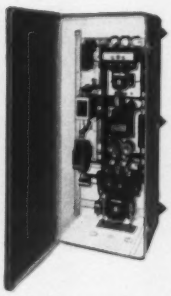
MANUAL AUTO-TRANSFORMER starter for use where load conditions or power company rules require reduced voltage starting. The air break starter shown has double break, silver alloy contacts.

BULLETIN 646



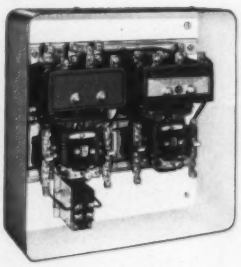
AUTOMATIC MULTIPOINT RESISTANCE starter for use on network systems. Resistors inserted at starting are cut out in definite steps. Time intervals adjustable to provide velvet smooth starting.

BULLETIN 741



AUTOMATIC STEPLESS RESISTANCE starter is not equalled for velvet smooth motor acceleration. It will satisfy any power company requirement. Eliminates lamp flicker on networks used for power and lighting.

BULLETIN 742



AUTOMATIC PART WINDING starter for use with squirrel cage motors having two separate parallel windings. Made in two-step type, and three-step type with resistance connected in the line on the first step.

BULLETIN 736

2-61-RM

ALLEN-BRADLEY

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Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
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QUALITY MOTOR CONTROL

How Consumers View Recession

It's encouraging that buyer attitudes are not slumping as they did in '58 recession.

Uneasiness is widespread, but there's little fear of a serious or prolonged business slump.

■ Is there a difference between the present slowdown and previous ones?

Consumers seem to think so. The latest Univ. of Michigan survey of consumer attitudes (see p. 7) shows that buyer optimism has not evaporated.

Uneasy, But—True, the consumer is uncertain about the economic outlook. Fewer buyers are convinced that good times are likely in the next twelve months. They are uneasy about business trends and their own financial situation.

But, the survey points out, there is a distinct difference between consumer attitudes in the 1957-58 recession and those now. During interviews in late 1957, there was a clear shift from optimism to pessimism.

However, in late 1960 there was little outright pessimism, although uncertainty had increased. Fears of a serious or prolonged recession are not noticeable.

Pessimism Halted — Even more important: A trend toward pessimism reported earlier in 1960 has been arrested. While consumer sentiment made no improvement between May and October-November (the most recent survey), pessimism has stopped spreading.

Based on the survey, here's how the consumers feel on specific issues:

Prices: Resentment against inflation has declined during the past year. And belief that prices have stabilized has increased. Because of this, for the first time in over two years, more people expect price developments will be "to the good" rather than "to the bad." This was noticed especially in regard to auto prices.

The Election: Because interviewing took place both before and after the Presidential election, it's possible to compare consumer attitudes in the two periods. Apparently, the survey notes, people's evaluations of business prospects underwent considerable improvement following the election. But, it's pointed out, "to some extent this shift represents an expression of partisan feelings and may be temporary."

Need for Goods: Arguments that consumers are "bought-out" on major goods purchases are not indicated by the survey. The results show most consumers have unsatisfied desires which they can discuss specifically. These include better housing, a new car, other durable goods, vacation trips, and many other things.

Buying Autos: Intentions to buy automobiles during 1961 show a pronounced rise over the October-November 1959 figures in all income groups. For new cars, the percent of families intending to buy is "at least as high now as at any time since late 1956."

Comparing Depreciation Rates

■ Few business questions are hotter right now than depreciation allowances.

With the Treasury's depreciation survey just out (IA, Jan. 12, p. 31), the issue is getting plenty of attention. Now the Machinery and Allied Products Institute has issued results of a study comparing depreciation in the U. S. with other countries.

How U. S. Rates—The contrasts show clearly why American business is pushing for more liberal depreciation allowances.

Countries compared with the U. S. include Great Britain, Canada, West Germany, Sweden, France, Italy, and Japan. In regard to production equipment, these are the findings:

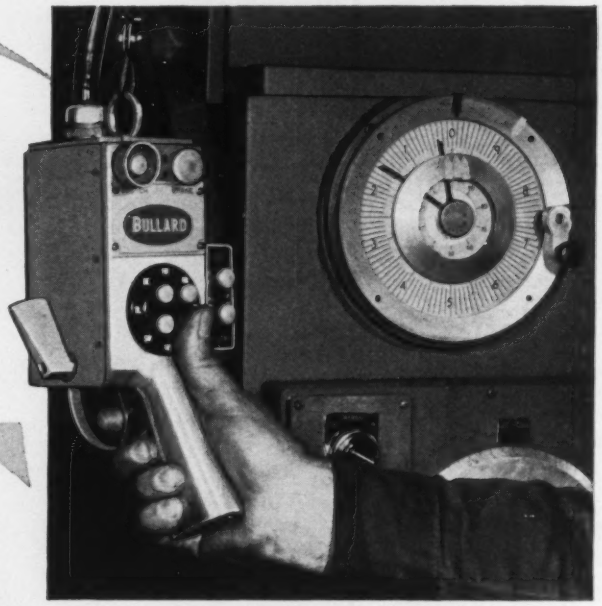
In two of the other countries the first-year writeoff exceeds 50 pct of equipment cost. In two more it exceeds 30 pct. But for the U. S., the figure is 13 pct.

Only Germany Close — Two countries permit recovery of more than 70 pct of cost in the first three years of service. Two more allow over 60 pct.

However, the U. S. equivalent of this is 35 pct. Only one country (West Germany) is in a comparable position with the U. S.

Lower Costs — Increase Profits with

CENTRALIZED POWER CONTROL

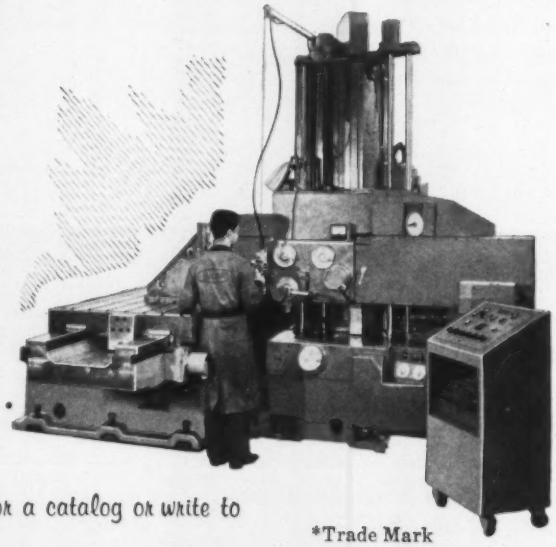


..... on the BULLARD DYNAMILL* H.B.M.

Large, easy to read clock-type dials allow the operator to "power" position the head, table, saddle and spindle in relation to the work piece without the use of hand cranks or levers. These dials, when the machine is equipped with numerical control, provide an accurate, instantaneous visual read-out on the positioning of the system.

Simple push buttons on the control pendant direct all motions of the head, table, saddle and spindle. Spindle start and stop, as well as spindle speed changes, are controlled from buttons on the pendant. Four traverse rates and feed engagement are actuated by the operator's forefinger on the pendant trigger.

Thus, within the span of a man's hand, are centralized power controls which allow the operator to keep the tool in the cut more of the time — thereby reducing costs and increasing profits.



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GM Defends U.S. Auto Industry

GM president says production and sale of consumer goods create the wealth that makes social progress possible.

He denies, also, the charge that the industry is abdicating its leadership position at home. By A. E. Fleming

■ The two major challenges to America's economic life and to U. S. engineers are an "austerity philosophy" and foreign competition, J. F. Gordon, General Motors Corp. president, said in a speech before the Society of Automotive Engineers.

He took a verbal potshot at "lay evangelists" in the U. S. whose doctrine is that the American way of life is sinful.

"They're exponents of a new austerity, a new puritanism, a new spartanism," he said. "They almost seem to suffer from a guilt complex. To these new hair-shirt philosophers, social goods are intrinsically more important than personal goods. They'd have us believe the U. S. is sacrificing social benefits for material indulgence."

Pays the Bills—He said that under this theory, production of consumer goods like cars "is using too much energy and too many resources that should be allocated to public goods like schools, hospitals and missiles."

Yet, it is this production, he said, "which makes possible the tax revenues necessary to create social goods."

Leadership Shrinking — Discussing foreign policy, he said that the U. S. no longer has undisputed preeminence in mass production and that our production leadership is shrinking.

"No Apologies . . ."—He said the charge is untrue that the U. S. auto industry is meeting this challenge by sidestepping it—abdicating its leadership position and moving abroad. "We've no apologies to make for being what some refer to slightingly as an international corporation."

Chevy Plans New Car

Meanwhile reports continue to fly that Chevrolet will bring out a model next fall that fits between the Convair and regular Chevrolet.

Whether the new-size Chevy will have a six- or four-cylinder engine is still in question. Engineers have been working on both for some time. The four was originally set for 1963 model introduction.

Aluminum appears to have been ruled out for blocks, which will be made of cast iron. The four-cylinder engine is said to be nothing more than the in-line six with two cylinders lopped off. The six is lighter, smaller than the present Chevy six.

Chrome Rings

Ford is not sparing the chrome on a new six-cylinder truck engine that will come out in mid-February. Developed at a cost of $3.4 million, it will be the most powerful six in Ford's line (262 cu in., 152 hp). Among the interesting features: Cast aluminum pistons with a cast steel ring at the upper ring groove to minimize wear from the upper ring; an upper compression ring with .006 in. minimum flash chrome and steel oil control rings with chrome plate.

No Takers for Color

Practically unnoticed, the Aluminum Company of America has offered copper-colored aluminum to automakers. Only gold has been offered previously.

Alcoa sales officials say they thought the copper color would interest automakers, but it's "no sale."

Autos to Use More Magnesium

As the Dow Chemical Co. sees it, large transmission parts offer the best potential for more magnesium poundage on U. S. cars.

Except for magnesium instrument panel parts on some 1961 cars, most magnesium production experience so far in the U. S. has been with small parts such as fuel pumps and steering column brackets.

Borrow from Europe — Magnesium has been used successfully in the crankcase and transmission of the Volkswagen. Dow thinks it can do the same job in America.

Automakers, of course, are using or testing magnesium as they seek lighter engines, transmissions and structural interior parts.

Robert Pittsley, magnesium sales manager of Dow's Detroit office, predicts volume usage of magnesium on large transmission parts within three years. He also says the auto industry will use 10 lb of magnesium per car by 1965.

Plenty of Metal — To show it means business, Dow is in the final stages of completing a unique customer service laboratory. The lab will be available to automakers and other magnesium diecasters.

According to Dow, it has 100 million lb of magnesium capacity available this year if the auto industry wanted it. Dow says the amount can be doubled as the need arises with only a moderate investment.

New B&W REFRACTORIES FOR THE METALS INDUSTRY

B&W's line of refractories has been enlarged by the addition of new heavy duty firebrick and new ramming mixes. These new products, now offered after many years of developmental and field experience, are specifically designed for superior service in blast furnaces, electric furnace roofs, submarine ladles, metal mixers, soaking pits, billet and slab heating furnaces, salt bath furnaces, aluminum melting furnaces, lead melting furnaces, zinc recovery furnaces, nickel smelting and copper and brass furnaces.

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HIGH BURNED SUPER DUTY FIREBRICK

Fusion point 3220 F. This brick offers an excellent balance of properties to assure superior service. It provides approximately 5% more alumina content and lower total impurities than competitive brick. It has excellent spalling resistance.

KAO 60

60% ALUMINA FIREBRICK

Fusion point 3250 F. Provides higher hot load strength than any competitive brick. Spalling loss is only 1%.

KAO 70

70% ALUMINA FIREBRICK

Very low total impurities provide long life. Spall loss of only 2%.

RAMMING MIXES

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MULRAM E

USE LIMIT 3200F
ALUMINA CONTENT–80%

This new ramming mix with extremely low permeability provides exceptional resistance to slag or molten metal penetration. High strength provides good erosion resistance.

MULRAM EF

USE LIMIT 3100F
ALUMINA CONTENT–80%

Similar to Mulram E but supplied in finer grain.

FOR COMPLETE PROPERTIES SHEETS and additional information on these new B&W Refractories products, write to The Babcock & Wilcox Company, Refractories Division, 161 East 42nd Street, New York 17, N. Y.

R-487

B&W THE BABCOCK & WILCOX COMPANY

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How Aircraft Makers Diversify

Boeing Offers Example of What Can Be Done

Moving with the times, the old-line aircraft companies in the Farwest are diversifying at a fast pace.

Boeing, for example, has associated products and industrial product divisions.
By R. R. Kay

■ Pretty soon, you won't recognize the old-line planemakers on the West Coast.

They're diversifying at a fast pace. Boeing, Convair, Douglas, Lockheed, North American, and Northrop are doing it. Some are far ahead of others.

Boeing is one company that isn't dragging its feet. It's dropping "Airplane" from its corporate title. New name: The Boeing Company.

Wide Range Interests—This firm has 250 products or processes with sales potential. So it has now set up Boeing Associated Products. The new unit will try to sell the company's inventions and research discoveries.

Typical products: Mechanical and structural equipment and tools, engines, sensing devices, and electronic and electrical gear. Associated Products plans to give a marketing service for these. It's looking into license agreements, patent sale, joint ventures, and subcontracting.

Space Trackers—Boeing also has set up a new division to build giant antennas. They're for vehicle tracking deep into space. Other uses are for radio telescope observations and early warning radar bases.

In the past 12 years, the company made more than 50,000 units. Boeing figures its long-time experience and the government market for these giant antennas warrant separate division status for this operation.

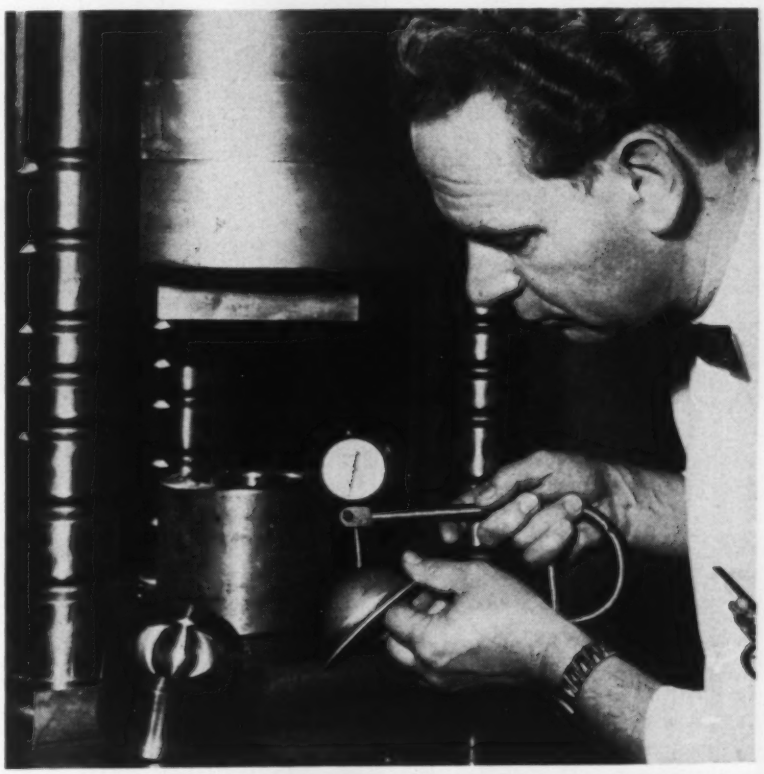
High Hopes—Boeing has high hopes, too, for its Industrial Products Division. It is moving ahead with the gas turbine engine for military and commercial helicopter and fixed-wing markets.

Speed in Space

Aerospace craft of tomorrow may travel up to 300 miles high at more than five times the speed of sound. But Aerojet-General Corp., Azusa, Calif., is now studying such a vehicle.

The company aims to establish techniques to guide engineers in the design of advanced 70-deg-angle swept-wing aerospace craft.

Water Helps Form Missile Test Unit



SINGLE STROKE FORMING: Small missile test component of stainless steel is formed by Convair's Dynapak machine. Blank of stainless is placed across mouth of die, which is then turned upside down over the water. When Dynapak ram is fired against die, water, being non-compressible, forces steel back into die, forming the tank cap.

MACHINES DESIGNED WITH THE FUTURE IN MIND

PRODUCTION MACHINERY
GREENLEE

- Special Purpose Machines
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- Multiple-Spindle Drilling and Tapping Machines
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- Die Casting Machines
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- Hydraulic and Hand Tools

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Through every phase of the construction of a Greenlee transfer machine, Greenlee engineers maintain a close contact with you, the customer. They are strong on the buyer's viewpoint . . . know what cost-conscious management wants. They stay on the job from the time of initial planning until your machine is operating at full efficiency. This last phase—the proving out period—is especially important. Greenlee men are extremely helpful in bringing your machine up to full production . . . training your operators to keep it producing profitably. Call Greenlee. Let them show you how cooperative teamwork can benefit you.

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England Is Going Automatic

Plant Modernization Is Up in Western Europe

The modernization of plant facilities is on the increase in Western Europe. This is true also with tape controls.

George Knopf, manager of Bendix Industrial Controls, reports that England is going automatic.

By R. H. Eshelman

GEORGE KNOPF: "Britain's aggressively using tape controls."

■ Western European manufacturers have the lead in plant modernization and they are not about to relinquish it.

That's the impression of George Knopf, manager of Bendix Industrial Controls, who has just returned from the last of several trips to Europe.

In the course of this latest trip he visited plants in England, Scotland, France, Germany, Switzerland and Italy, with a particular eye on the status of numerical controlled tools in those countries. "From my personal survey," he observes, "I'd say it's quite clear that more tape control systems are in use in England than in all of the rest of Europe put together."

More Widely Spread—Some of these are in the aircraft industry, he adds, but they are more widely spread in general commercial operations in England than in the U. S. One particular place the British have found for numerical control is in flame-cutting heavy plate, as in ship construction.

This development has received considerable impetus. Rather than layout the part pattern and then cut it out with a hand torch, they merely program it on tape. Ability of one tape to cut both right and left hand parts makes an attractive arrangement — which apparently pays off.

Also, Mr. Knopf notes, Britains has been more aggressive in applying contouring tape control to small machines. They're using such controls very successfully on equipment in the size range of number two knee mills. This makes a compact, inexpensive setup, which can handle a variety of parts.

A Different Matter—On the Continent, however, it's a different matter. Mr. Knopf reports that, based on observation and information gathered, he doubts if a half-dozen tape machines are in production. Yet at the Paris tool show last year there were several European systems demonstrated.

However, he feels this situation may change. One of the things that can bring this about is the very impressive prosperity. Metalworking plants are active. Machine tool makers seem to be running a typical 12-month backlog.

There's one cloud looming on the horizon, however: A shortage of skilled labor.

It seems to be catching up with manufacturing. Mr. Knopf sees signs that this increasing pinch on manual skills may have much to do with the kinds of equipment going into plants in the Common Market.

Less Workers—Managers admit they will be forced to build products without so many skilled workers. So tape control seems to be a natural answer. And companies in Europe have the money available to get the tools they want.

Further, plant managers evidence a readiness to buy the equipment they need to keep on top.

Barrel finishing is best finishing

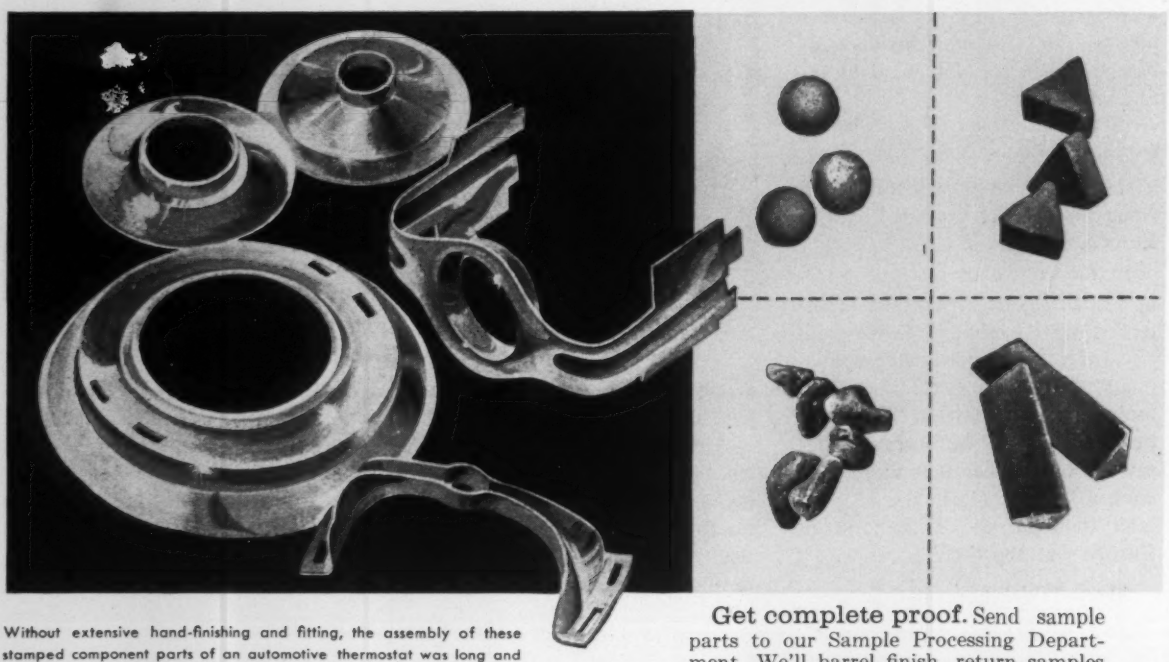
. . . to cut your assembling costs

Assembling finished parts is no longer the money-wasting problem it used to be.

Barrel finishing with Norton TUMBLEX abrasives is your modern solution . . . your surest, quickest way to remove burrs, heat scale, sharp or rough edges and other surface imperfections that keep complicated parts from fitting together smoothly and accurately.

We say *your* solution because the scope of TUMBLEX abrasives is virtually unlimited. The parts you finish . . . for assembling or for any other purpose . . . can be of any metal, ferrous or non-ferrous . . . or non-metallic including plastics and even woods . . . as hard as sintered oxides or soft as the softest machinable material . . . and their sizes can range from miniature to massive.

Barrel finishing with the right TUMBLEX abrasive not only improves your product appearance and quality — its speed and simplicity can increase your man-hour productivity and cut your cost-per-piece produced.



Without extensive hand-finishing and fitting, the assembly of these stamped component parts of an automotive thermostat was long and difficult. Barrel finishing with Norton TUMBLEX* abrasive proved unequalled for removing burrs that brought new speed to assembling.

Get complete proof. Send sample parts to our Sample Processing Department. We'll barrel finish, return samples and report the methods and abrasives you need for new production advantages. NORTON COMPANY, General Offices, Worcester 6, Massachusetts. Plants and distributors around the world.

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NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

D. C. McCarthy, elected executive vice president, Pratt & Whitney Co., Inc., West Hartford, Conn.

Detroit Steel Corp. — **R. A. Schrage,** elected a vice president.

Kenosha Div., Anaconda American Brass Co.—**E. V. Pierce,** appointed vice president, midwestern region.

Conoflow Corp.—**J. R. Simpson,** elected a vice president.

Bethlehem Steel Co. — **N. M. Emery,** appointed manager, patents; **A. M. Griffin,** named chief patent attorney.

SKF Industries, Inc.—**J. R. Miller,** appointed production manager.

United Air Lines—**D. L. Larson,** appointed systems engineering manager and **W. G. Williamson,** as operations research manager, Industrial Engineering Dept.

Wheeling Steel Corp.—**K. N. Bundy,** named superintendent, Utilities Dept., Steubenville Works; **H. H. Phillips Jr.,** named asst, superintendent, Coke Plant Dept., Steubenville Works.

Behr-Manning Co.—**S. E. Bacon,** named industrial sales manager, midwestern region.

The Bendix Corp.—**F. E. Hibbard,** appointed Pacific Coast regional manager, Bendix Industrial Controls Section.

Bay State Abrasive Products Co. —**R. J. Olmscheid,** appointed an abrasive specialist, Midwest sales area.

E. W. Bliss Co.—**Joseph Hauf,** appointed technical director, engineering.

De Laval Steam Turbine Co.— **M. B. Sennet,** appointed asst. to the vice president and **D. T. Bixby,** as manager, IMO Dept.

The Youngstown Sheet & Tube Co.—**E. E. Lynn,** named asst. general counsel.

Republic Steel Corp.—**R. A. Bechtold,** appointed asst. superintendent, openhearth and electric furnaces, Gadsden, Ala., plant.

H. M. Winterson, elected vice president, administration, Blaw-Knox Co., Pittsburgh.

Erie Forge & Steel Corp.—**D. C. Bartow,** appointed district sales manager, New York Offices.

Fairbanks, Morse & Co.—**F. C. Di Luzio,** named general manager, Alburquerque Electronics Research Div.

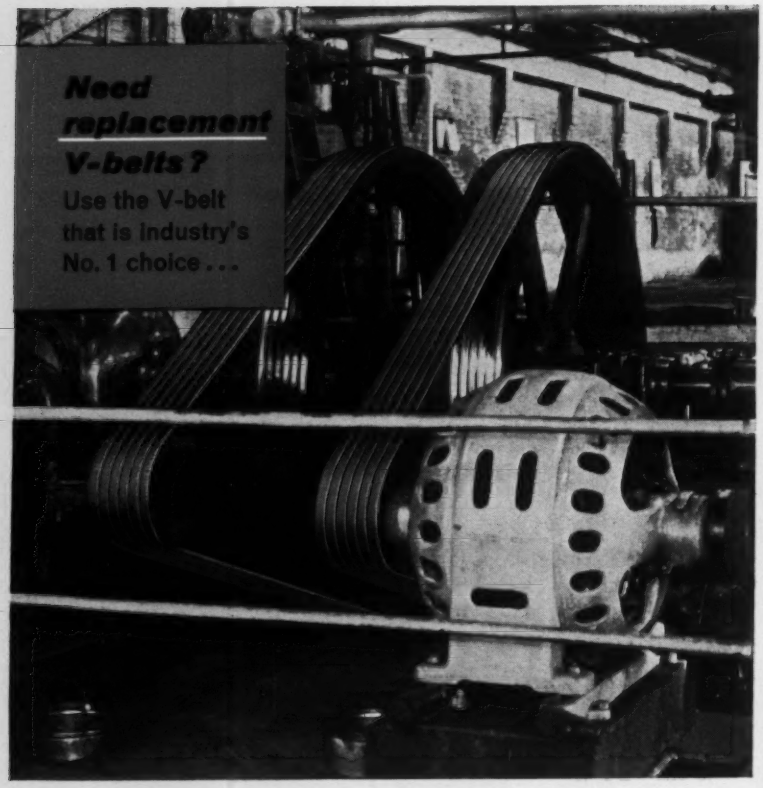
Republic Steel Corp. — **J. H. Ziegler,** appointed superintendent, Sheet and Tin Dept., Warren plant.

The Colorado Fuel & Iron Corp. —**Gene Kohler,** appointed general foreman, Wire Mills' Drawing

F. T. Harrington, appointed vice president, marketing, The Foote-Burt Co., Cleveland.

G. P. Baumunk, appointed vice president, commercial, Washington Steel Corp., Washington, Pa.

J. H. Nelson, named executive vice president, Kropp Forge Co., Chicago.



Gates Hi-Power V-Belts give you longer service life on your drives

Concave sidewalls (U.S. Pat. No. 1813698)—It is easy to see why Gates Hi-Power V-Belts give far longer belt life than ordinary V-belts. *Just make this simple test:* Bend a Gates V-Belt as if it were going around a sheave. Feel how the concave sides (Fig. 1-A) *fill out* . . . become perfectly straight (Fig. 2-A) to make *full contact* with the sides of a sheave. The belt thus grips the sheave evenly, and distributes wear uniformly across the sides of the belt, lengthening belt life.

Precisely-engineered arched top—The arched top (Fig. 1-B) of the Gates Hi-Power V-Belt prevents any distortion of the tensile section cords as the belt bends around the sheave . . . the load is uniformly distributed with each cord carrying its full share.

You will get fast delivery of Hi-Power V-Belts from the local stock of your nearby Gates Distributor. Call him today.

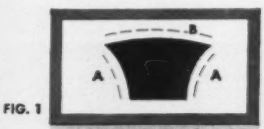


FIG. 1

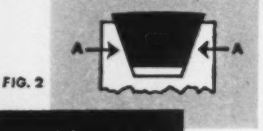


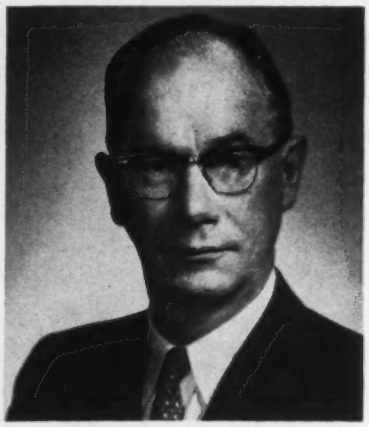
FIG. 2

The Gates Rubber Company
Denver, Colorado
BP-6

Gates Hi-Power V-Belts

Room; **J. E. Murphy,** appointed general foreman, Wire Mills; **R. P. Hanagan,** appointed asst. superintendent, Wire Mills.

E. B. Mitchell, appointed asst. to the vice president and general manager, Sheffield Div., Armco Steel Corp.



W. L. Keene, appointed general manager, operations, Superior Steel Div., Copperweld Steel Co.

National Supply Div., Armco Steel Corp.—**J. A. Emery,** appointed asst. sales manager, merchandising products.

Chase Brass & Copper Co., Inc., Warehouse Div.—**D. S. Soliday, Jr.,** appointed marketing manager.

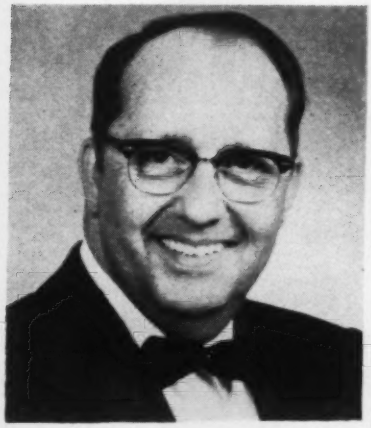
The Austin Co., Steel Fabricating Div.—**L. O. Schaefer,** appointed works manager, Cleveland.

Aronson Machine Co., Inc.—**C. J. Siebert, Jr.,** appointed general sales manager.

Whitehead Metals, Inc.—**A. E.**

Schnopp, appointed purchasing agent.

The Cuno Engineering Corp.—**L. T. Curran,** appointed asst. manager, manufacturing.



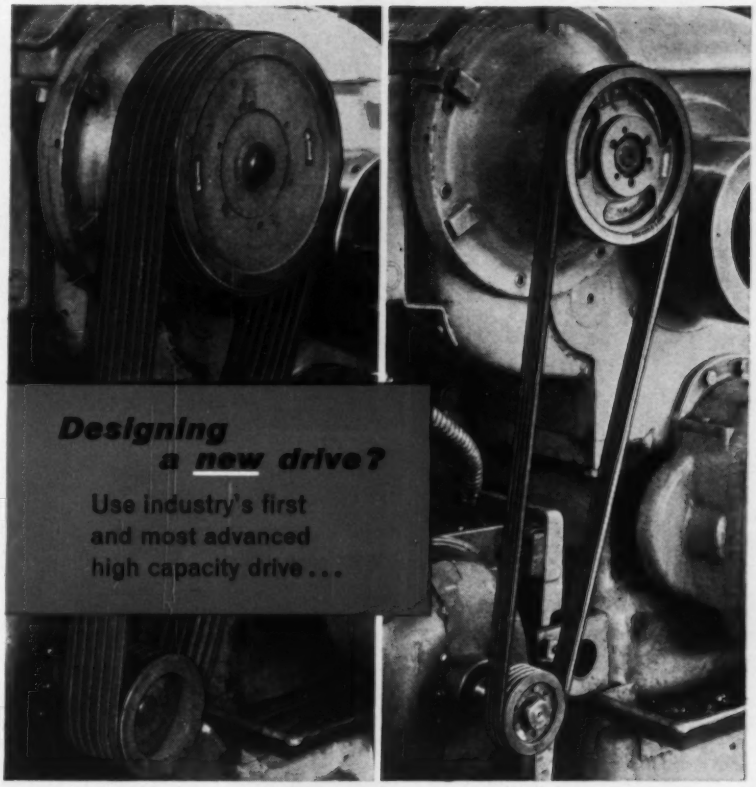
J. W. Palmer, promoted to general manager, Cast-Master Div., Hydraulic Press Manufacturing Co.

R. D. Critzer, promoted to sales manager, Cast-Master Div., Hydraulic Press Manufacturing Co.

Doehler-Jarvis Div., National Lead Co.—**A. D. Gildemeister** and **W. G. Knuff,** named asst. sales managers, Toledo; **C. E. Robitaille,** appointed plant manager, Grand Rapids, Mich., plant, and **C. E. Claus,** named sales manager, Grand Rapids.

Southern Pipe Div., U. S. Industries, Inc.—**F. D. Childress,** named controller.

U. S. Steel Corp.—**N. C. Michels,** appointed vice president, facility planning and appropriations.

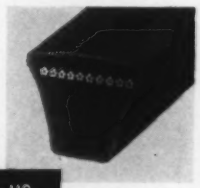


Gates Super High Capacity V-Belts save drive space, weight, money

If you are designing a new drive, or if the belts and sheaves of a conventional V-belt drive must be replaced, you will benefit many ways by installing a Gates Super HC High Capacity V-Belt Drive.

Gates Super HC V-Belt unites new, high performance materials with a basic change in the shape of the belt itself. Because of this, it is able to handle up to 3 times the horsepower of a conventional V-belt in the same space. As a result, Gates Super HC Drives can often cut in half the space required for your drive. Drive costs are cut as much as 20%, and drive weight reduced 20% and more. Guards can be smaller. Bearing loads are less, increasing bearing life. And the drive can operate at belt speeds up to 6000 ft/min without dynamic balancing!

There is a Gates Field Engineer serving your area. To contact him for help in designing a new drive, call your nearby Gates Distributor.



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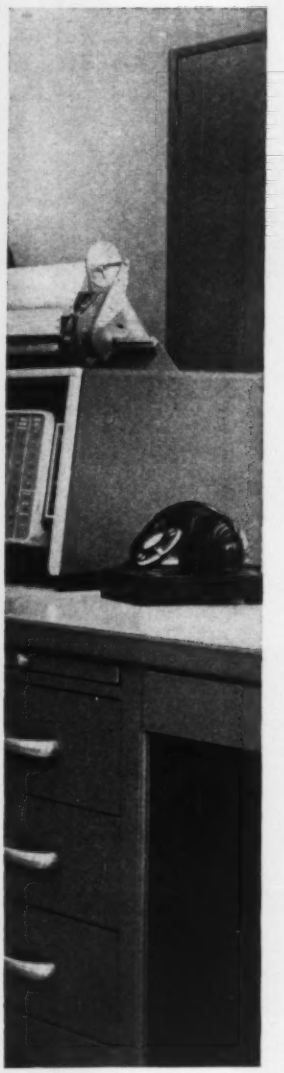

...improves delivery and reduces inventory
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Must Revise Space Plans

The nation's space effort needs major revision, President-elect Kennedy was informed by his space task force. What's needed: more government aid for industry space projects; less "routine management" of urgent missile programs; end to inter-service and civilian competition; spacecraft with a more powerful thrust. Vice President-elect Johnson, who'll head up the Space Advisory Council, has already indicated space plans are slated for a fine-tooth-comb treatment.

Ready Saturn Launching

Firing of the Saturn is close at hand. The Saturn, a booster rocket with more than a million tons of thrust to lift multi-ton loads into orbit, will have first stage launched this year. So says T. Keith Glennan, outgoing head of NASA. Completion of the massive network is expected by the end of March.

Puts Squeeze on Talent

Many observers are confident the engineer shortage has eased. But there's strong evidence that the swing to heavier R & D will increase the squeeze on aircraft, missile, and electronics firms—heretofore the hottest U. S. market for engineering talent. One survey suggests a 6 pct gain in engineering job openings in 1961 and a 2.5 pct advance in starting salaries.

Need Tracking Device

Contracts just awarded four companies call for a large, 200+ ft tracking antenna to study lunar and deep space probes. It would greatly boost return of data from spacecraft. A world-wide network will probably be set up if design proves out. The program could develop into a multi-million dollar business in five years.

Travel on Air Cushion?

Potential military and commercial uses will speed the development of large air-cushion vehicles, say automotive experts. Small test craft are showing the way. The Marine Corps is reportedly very anxious to order amphibious landing vehicles of that type. A British firm is said to have on the drawing board a channel hovercraft ferry to transport 300 passengers plus 30 tons of freight at speeds up to 90 knots.

Talk About Growth!

Space exploration, now a $1.3 billion business, is likely to be twice as much in three years and three times as much in five years. What's the spending outlook for the major space programs? Lionel D. Edie & Co. makes these projections by fiscal years.

SYSTEMS OR CONCEPTS	$ Millions 1961	1966	Pct Change
Dynasoar	58.0	200.0	+245
Notus	42.0	300.0	+614
Midas	102.0	300.0	+194
Navigation and Tracking	54.0	400.0	+637
Samos	200.0	650.0	+225

The $200 million figure for the Dynasoar in 1966 is very conservative. Program may well be $400 million.

Satellite systems aren't alone in plans for greatly increased spending. Missile expenditures, now about $3.5 billion, are expected to reach about $7 billion in five years.

Stops Metal Deterioration

The report is that the Disil process shows promise for protecting metals from high temperature (over 3000°F) erosion. The process involves coating with silicon and other materials. Applications include combustion chambers, tail pipes, and heat shields for ballistic re-entry bodies.

Tiny Space Hardware

Look for molectronics devices to spearhead the next wave of miniaturization to hit the aerospace field. These devices—smaller than present transistors—will drastically reduce the number of soldered connections needed. They will also do away with need for many standard components, and add to reliability of lightweight equipment.

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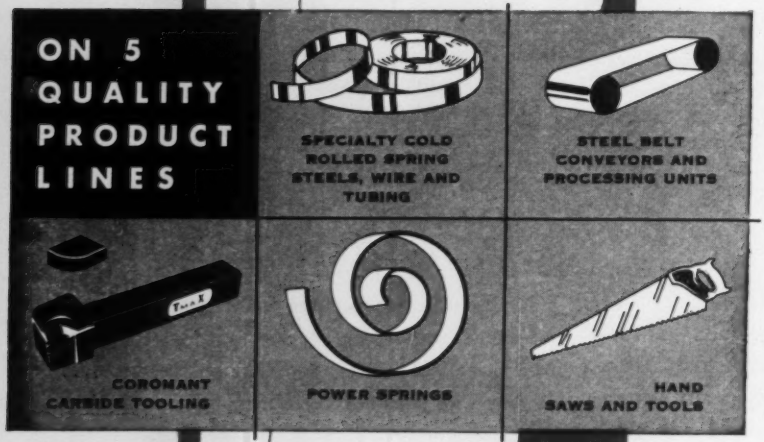
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System Automates All Handling Of Big Structural Assemblies

Structural fabrication took a giant stride forward with a mechanized-handling system for sections up to 80 ft long.

This system applies automation to all welding, drilling, reaming and painting work.

By **R. H. Eshelman**
Machinery Editor

▪ To meet fierce competition, rising labor costs and narrowing profit margins, a major structurals fabricator has turned to automation. The R. C. Mahon Co., Detroit, admits that the structural-steel industry has long relied on out-dated methods. If changes weren't already long overdue, the newest high-strength-bridge designs would demand improved methods.

An example is the New Albany Bridge destined for the Ohio River between Kentucky and Indiana. This bridge will use 100,000 psi yield-point components. Employing bolted and welded construction throughout, the new bridge may be the first to reach this strength summit.

Fabricating high-strength beams and columns poses some stiff challenges at quality levels. New methods, used in a completely automated setup, meet this test. These methods also lead the structural-steel industry into an era of efficient high-quality production.

Sweeping Revision—R. C. Mahon Company's new setup cost more than $600,000. However, the end result is well worth the cost. It centers on automated welding and the industry's largest mechanized paint-conveyor system. Another feature is the structural-steel industry's first use of a numerically-controlled drilling line.

During the next five years, management plans to replace almost all production equipment in the structural division. "Objective of our modernization program," advises W. F. Sheetz, company president, "is to fabricate structures in the shortest possible time and at the lowest possible cost.

"We plan to meet that objective through greater integration of our plant operations, with modern metalworking methods and the latest materials handling devices. The final phase of our program should strengthen our competitive position," he adds.

Use Numerical Control—A major

NUMERICAL DRILLING PAYS OFF: Automated drilling reduces production expenses. It saves about 85 pct of the old manual-drilling costs.

step toward this advance is the use of numerical controls for automating drilling. This move pays off with cost savings of about 85 pct per hole.

"Now we get an exact pattern of holes," explains Walter Willard, executive vice president. "Once the entire shop is changed over, we will handle the largest gusset plates by numerically-positioned drilling. This will eliminate reaming altogether. The result will be cost reductions up to $100,000 on a single job."

Previous methods for making holes in structurals include hand layouts, center punching and radial drilling. Cranes do most of the handling. These methods are made obsolete by the faster, more accurate numerical drilling system, designed and built by Walter P. Hill, Inc.

Whips Manual Tradition — The new automated system achieves its biggest gain by using mechanized run-in and run-out conveyors. These conveyors release the drilling work from constant crane loading and unloading. At the same time, they provide "live" storage for beams and columns up to 80 ft in length. Each conveyor stores 20 beams.

The high-speed drilling unit consists of two opposed spindles and a vertical spindle. It drills or gun drills up to 1½-in. holes in alloy steels at speeds up to 30 ipm. A single worker operates the entire production line.

In use, overhead cranes load beams or columns or a product mix on the run-in conveyor. By push-button control the operator feeds one beam at a time to the machine table.

As it advances hydraulically, the beam is clamped and drilled under tape controls. After the tape-programmed hole patterns are drilled, the operator pushes an unload button to discharge the part onto the run-out conveyor. Then an overhead crane picks up the part and transfers it to assembly bays.

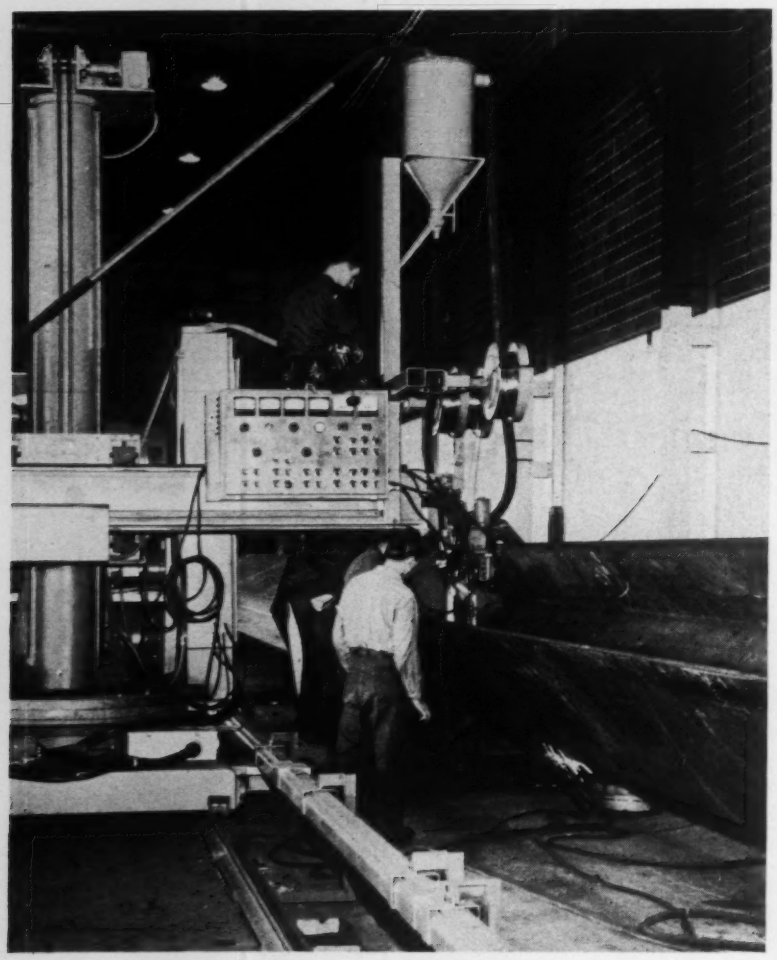
Flexible Control—All drill heads have X-, Y-, and Z-axis control. Drives are hydraulic cylinders, with ball-bearing lead screws, gear-speed reducers and selsyn pickups with ¾-hp dc-positioning motors. Flexibility is inherent through three operating methods: tape control, dial control or manual override. Dial control allows a random hole, which isn't programmed, to be put in by the operator.

Walter Hill, the designer of the machine, views this development as the forerunner of many improvements. "The steel-fabricating industry is one of the most fertile fields for cost-saving applications of numerically-controlled drilling," he says.

"This beam and column machine is only the first of a series of units which steel fabricators plan. Others, on design boards, include a single-spindle unit for drilling detail plates, and a machine with two vertical spindles that will drill built-up sections up to 18 ft wide."

Other Areas—Although tape-controlled drilling is the latest and most dramatic step in Mahon's modernization program, other factors help to reduce production costs. Improved welding methods, coupled with mechanized materials handling, represent major additions to the program. High-speed mechanized and automatic submerged-arc units replace all manual-electrode equipment.

The main purpose of the new welding equipment is to keep welded parts moving through the plant faster and at lower cost. The new units deposit welds about 2-5 as



RAPID WORK: Automatic submerged-arc unit traverses heavy girder to deposit a high-strength weld for section of 100,000 psi bridge.

fast as manual operators. Hand welding is limited to tacking and very short welds.

Big cost gains lie in the fact that on structurals, welding expenses are directly proportional to speed. The New Albany Bridge requires 57 miles of high-strength welds. Therefore, welding speed yields the key to major cost reductions.

Painting by Conveyor — Mechanizing handling on the paint line was the first step in Mahon's structural-plant modernization. Setting up a line that conveys random sizes up to 130 ft long, without need for turning or shifting, paid off handsomely. It cut the cost of finishing big structural sections in half.

Total length of the line, including loading and unloading areas, is 400 ft. This line incorporates a paint spray booth at both top and bottom, a drying tunnel and a 100-ft long runout conveyor.

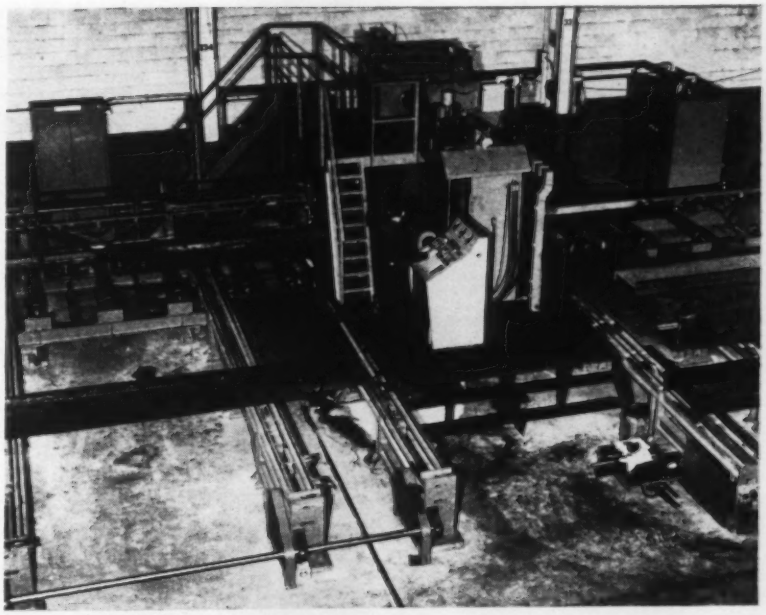
This makes the line the largest in the industry. Additional unloading facilities can be added at the end, when needed.

Painting station booths complete the job in a continuous operation. Updraft removes any paint-over spray. Diamond-shaped load bars give almost complete coverage.

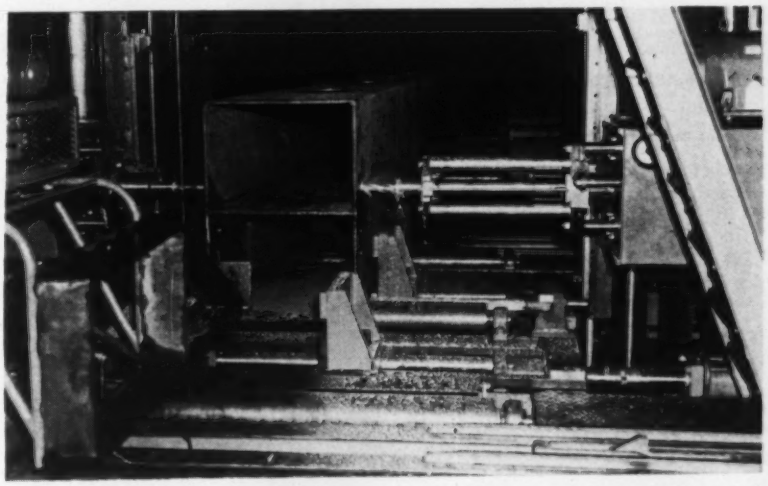
Streamlines Production — Within the new conveyorized system, an overhead crane transfers parts from the final fabricating and cleaning areas to the paint-line conveyor. This mechanized setup handles 200 tons of steel per shift day through all painting operations. By contrast, the limit per work day with former methods was 50 tons.

The paint conveyor line extends from the cleaning area directly to the shipping yard outside the plant. This gives another bonus. When structural parts are to be shipped unpainted, they transfer through to the shipping area with little handling, via the paint-system conveyor. Since the line's in constant motion, finished parts and structures are loaded on it as soon as they're processed.

All phases of the modernization program have boosted the shop's quality level, Mr. Willard reports.



EASY IN; EASY OUT: Numerically-controlled beam- and column-drilling machine brings complete automation to steel-fabricating plant.



REGULAR PATTERNS: Drilling carriage positions holes in alloy-steel welded box. The box later becomes part of a high-strength bridge.

Eases Headaches — Automatic welding gives good uniformity. This eases inspection headaches. It will also eliminate problems at the construction site.

Manual drilling posed another big problem because the operators aren't used to the high-strength steel. Tape-controlled drilling made this problem a thing of the past. Tape controls make it simple to program at optimum feeds and speeds. Operator skill doesn't enter the picture.

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Axles Welded in a Vapor Shield

Mechanized Auto Line Uses Innershield Welding

In the automotive field, it's a big step from drawing board to production line. Changes in design force engineers to test new ideas.

Welding and handling, both mechanized, show how it can be done.

By **R. H. Eshelman**

■ This season, engineers at Buick Div., General Motors Corp., Flint, Mich., have merged mechanized handling and a new welding line. End result is faster fabrication of Buick's new axle-suspension system.

Here, control arm brackets are welded onto rear axle housings. In the new design, changes had been made in both the position and shape of the brackets. The scope of this change led engineers to explore a relatively new welding process called Innershield arcwelding.

There's very little manual handling in the new line. Unit costs have been cut in half, as have the number of manhours needed to complete the parts.

An axle housing is an ungainly part to handle. Nevertheless, in-line transfer has been set up for at least some of the welding sequences. It includes automatic indexing, welding and unloading.

Why Not Move the Work?—One solution is to hold the welding heads stationary, then move the joint past them. The idea was worked out with the machine builder, National Electric Welding Machines Co., Bay City, Mich.

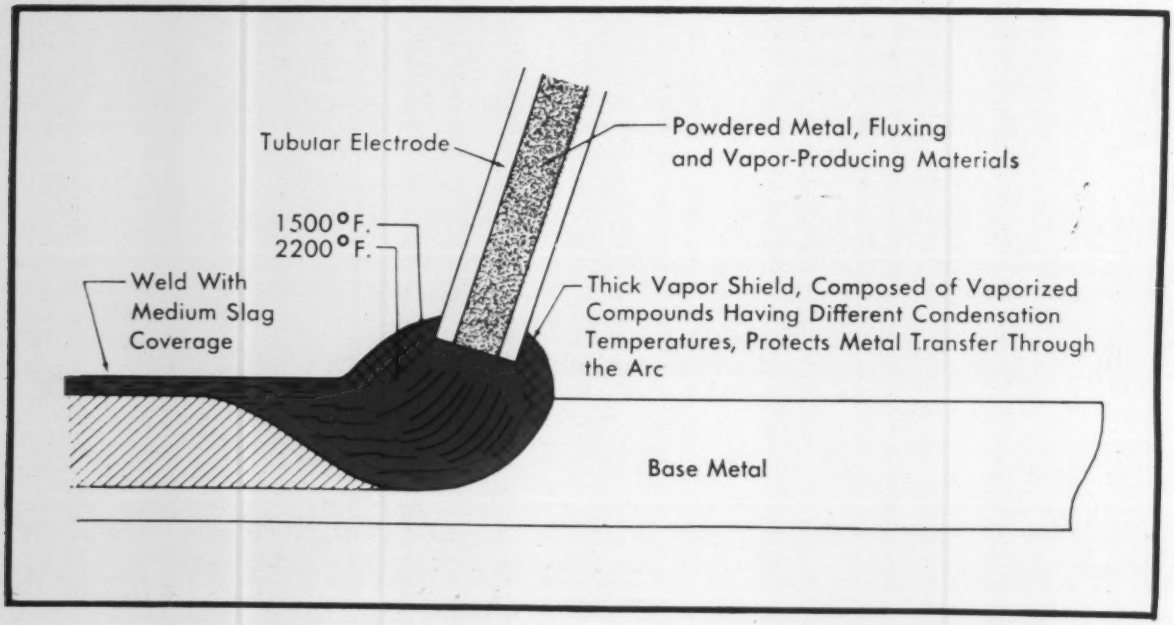
In the completed line, there are two transfer welding units. The first one makes five fillet welds on three of the brackets. This is done in two stations plus an in-between idle station. The second unit performs four fillet welds in assembling the track bar to the axle.

The changeover to Innershield welding does away with the problem of handling flux within the work area. Developed by the Lincoln Electric Co., Cleveland, the method features two main assets. First of all, it's fast; twice as fast, in fact, as manual welding. The process is also clean.

No Admittance — No outside shielding gets into the weld deposit. That includes gas, granular inclusions and wire coatings. Key to this feature is its shield of vapor. All the ingredients needed to shield, deoxidize and flux the molten weld are contained inside the tubular electrode.

Made up partly of metallic salts and oxides, these ingredients provide three functions. They melt before the tube melts. They also boil, thus

Vapor Shielding Helps Keep Welds Clean


Tubular Electrode
Powdered Metal, Fluxing and Vapor-Producing Materials
1500°F.
2200°F.
Weld With Medium Slag Coverage
Thick Vapor Shield, Composed of Vaporized Compounds Having Different Condensation Temperatures, Protects Metal Transfer Through the Arc
Base Metal

producing a vapor at a temperature lower than the melting point of the electrode metal. Then, too, they're chemically inert.

Let's see what happens during a typical run. Axle housings come down a gravity-roller conveyor to the first machine. An operator loads the housing by hand into the empty welding fixture. An upper control arm bracket is then placed against the banjo housing, and the assembly is clamped into the holding fixture.

Push Button—Welding begins at the press of a button. One weld is laid down while the axle rotates ahead. As soon as the part rotates back again, another angular weld is deposited on the other side of the bracket.

Between these two welds, the fixture shifts the parts to a new centerline of work. In fact, the only time that the welding heads move at all is to adjust to the contour of the axle.

Axles are then picked up by V-blocks and are moved along the shuttle conveyor to the idle station. While the operator loads another set of parts at the start of the line, the welded parts are transferred to a second welding station.

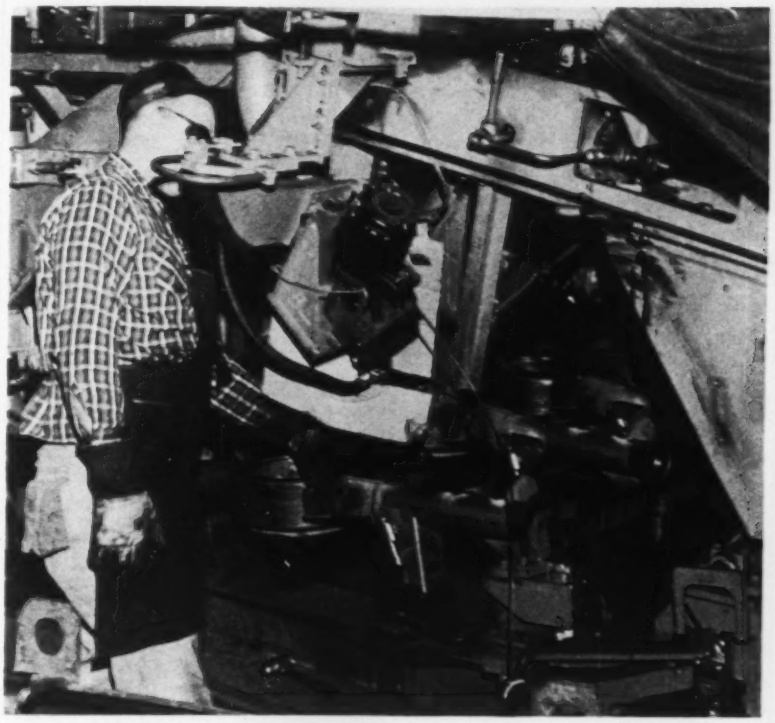
Here, three heads deposit simultaneous fillet welds. These welds are all longitudinal. Each head moves independently on an overhead track. One weld is angular, while the other two are parallel.

Tilting Fixture—As each parallel weld is made, the work fixture tilts 10° so that the electrode will flow in the downhand position.

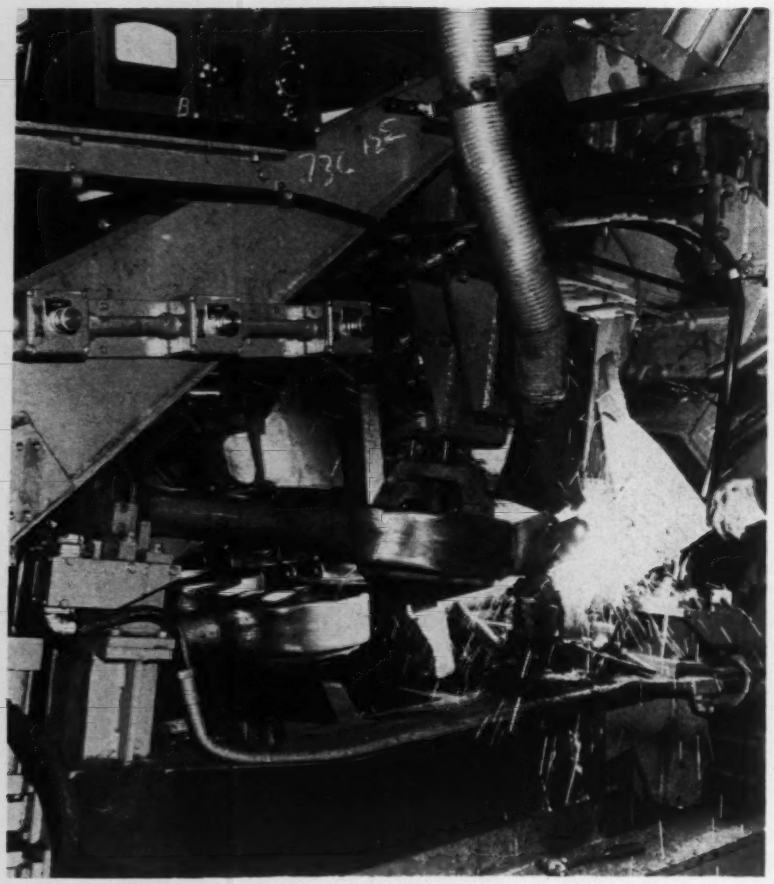
The axle then moves on to the next machine. This unit is really a repeat of the first station. Here, however, an operator loads both the axle and the track bar bracket into the holding fixture. The machine then welds the sides of the bracket. To complete this sequence, the heads move along on overhead tracks.

Next, the transfer shuttles the axles from the welding fixture to the

WELDING STATION: While axle housing and control arm bracket are loaded on work fixtures, other parts are welded automatically.



REVERSE SIDE: An operator takes axle from first machine, turns it around and then loads it into second transfer unit fixture.



DOWNHILL MOTION: The axle indexes to a tilted position. Dual longitudinal welds then assemble the track bar part to the axle.

idle station. After another axle is welded, the transfer device shifts the first axle onto the final welding station.

Two at Once—At this point, two welding heads make simultaneous angular welds on the track bar bracket. Because the radii of the welds shift longitudinally on the axle, the heads are cammed horizontally. They change angle as the work rotates past them in synchronized action at 122°.

The work-holding fixtures add to the success of the welding operation. For example, there's a banjo locator in the second welding station that helps position the axle positively. Then, also, in the station where radius welds are made on the axle, end pilots grip the housing at each end. They then rotate the work in lathe fashion.

Heavy Stock—Both the control arm brackets and track bar brackets are of heavy gage 0.120-in. stock. They are preformed in several stamping operations. That being the case, part fitup to the axle contour isn't easy. Even the nominal tolerances of 1/16 in. is hard to hold.

This is one of the reasons that Innershield welding is used. The process will still give an acceptable weld even though part fitup is slightly beyond normal limits.

In some cases, Stuart Spice, Buick's welding engineer, notes there is full strength even where the gap between parts is such that the bead becomes a "fill in." Many quality control checks confirm this claim.

Quick and Clean—The mechanized setup is a fast, clean operation. As such, you can get along without the clutter and constant janitor effort of manual or semi-mechanized welding.

Also, direct labor costs in such a complex design might run as much as several times that of the mechanized setup. For a long payoff period, Buick engineers feel that the aspect of automation could be pushed even further.

There were two barriers which had to be hurdled. One was the angle at which Innershield welding had to be performed. This required a special angle for the welding head.

Downhill Motion — The other barrier was the limit to which longitudinal welds could be made along the top surface of the axle. According to Lincoln's welding experts, it was better to weld downhill. The answer was to tip the work so that these welds could be made 10° to 15° downhill.

How far should automation go? Buick found it more practical to place an operator at each machine to watch parts being loaded. Also, the same operator would be right there to keep an eye out for breakdowns.

Timing was vital. On one hand, you must index the work for angular welds. At the same time, however, the welding heads must be synchronized with the indexing.

Still Synchronized — Where the heads are stationary (but the weld angle changes through camming) they are sequenced to start with the work movement.

It's a good idea to make sure that each welding head is able to follow its own path of travel. That means each head can be started, the arc begun and travel initiated separately. With a single drive, the heads all depend upon each other.

What happens when the heads are allowed to start at different intervals? You miss some of the weld.

GE Makes Carat-Size Diamonds

Synthetic Stones Still Need Higher Mechanical Properties

Small synthetic diamonds are serving the industrial field well as a proven metalworking tool.

Larger stones, in the full carat class, may soon be able to cover the full range of industrial needs.

■ Scientists are at the brink of a development that is sure to give metalworkers a shot in the arm. For the first time in history, man is making large diamonds.

According to Dr. Guy Suits, General Electric's director of research, the diamonds are over a carat in size, They are dark in color; but because of structural imperfections, the large synthesized stones lack sufficient mechanical strength for industrial uses.

Dr. Suits points out that development work is still in the early stages. For this reason, it is impossible to predict just when the needed properties will slip into place. But, when they do, the cost of diamond cutting tools is sure to be affected—no doubt in the user's favor.

Graphite To Diamonds—The scientific feat was achieved at GE's research laboratory at Schenectady, where the first man-made diamonds were announced in 1955.

The new, large diamonds are the latest milestone in a high-temperature, high-pressure research program that the company has pursued since its initial success in converting common graphite into diamonds.

The first synthetic diamonds were also dark in color. However, they were only thousandths of a carat in size or about the size of fine grains of sand. This size is used on many cutting, grinding and polishing jobs throughout industry.

Through the years, GE has learned how to tailor-make the small diamonds for optimum effectiveness. As a result, the smaller stones perform very well on the present metalworking jobs.

How Much Larger — The latest effort by GE to combine size and strength into its diamonds resulted in a 1/10 of a carat stone which has excellent industrial quality. Stones of this size are needed for metal-bonded diamond wheels and saws.

Full carat natural diamonds are now being used for drills, dressing tools, and single point cutting tools throughout industry. When the strength of the new carat-size synthetics is improved, the diamonds will compete with the natural stones in the full industrial range.

MORE STRENGTH: The large diamonds are over a carat in size; but still to be desired is improved mechanical strength for industrial application.

Are All Those Punches Needed?

By **H. R. Hugo**—Project Engineer, Dayton Perforators, Inc., Dayton.

When a punch breaks, how long do you have to wait for a new one? A day, a week?

That tool is specially made. Be logical. Start thinking in terms of simple standardization.

▪ In stamping, there's a condition known as "high limit sizing of open tolerance holes." Due to this condition, many different punches with special size points are used to make the same standard hole in a production part. This is the case even though that same hole appears again and again.

If a hole for a standard job is required, why should several punch point sizes be specified to make that hole?

Suppose a part drawing calls for a ¼-in. punched hole, ±0.005 in. to ±0.015 in. Because of clearance limitations between punch and die, tight hole size control is needed. As a result, diemakers must use punch size increments of 0.0005 in.

Thus, within the greater limits set up by product engineering, any one of 20 point diameters can be specified for the ±0.005-in. tolerance. The choice increases to 60 sizes in the other tolerance. Each size can easily become a stock item.

Traditional Thinking — What is the reasoning behind high limit sizing? It all starts when part hole tolerances exceed ±0.001 in. When that happens, specific punch point sizes are set up by rules of thumb.

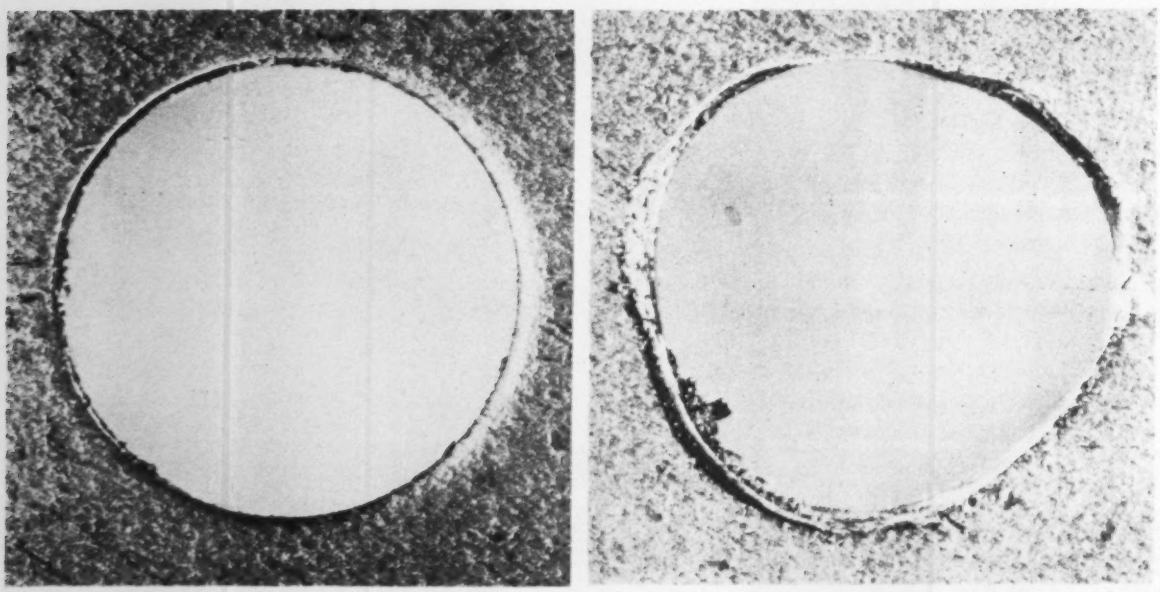
Don't you need this latitude to allow for wear? This is pure fiction because wear allowance isn't even required. Finished diameters of punched holes won't vary any more than minus 0.001 in. between a sharp new punch and one that is very dull.

Although a dull punch can increase burr, part distortion and tonnage on the press, it will not reduce the size of the hole.

Rising Costs—Look at the headaches involved in stocking, ordering, replacing and maintaining so many special point punches. Further, you never know the exact size of a high-limit punch. When it breaks, you have to remove the die from the line, "mike" it, then try to find a replacement.

To find the answer to the problem, let's go back to where it all started: the hole. The first thing to keep in mind before you attempt to specify a punch is the function of the hole itself. The hole is a product. It either clears something or fits something.

Who determines the function and specification of the hole? It's done by product design. Unfortunately, product design has been forced to use faulty bases for standardization. One of them consists of apply-



TRIM AND PROPER: A punched hole (left) is not only round but usually 0.0005 in. smaller than the punch point diameter. A drilled hole (right) is larger than the drill size and often out-of-round.

ing drill sizes and specifications to punching jobs.

Out-of-Round—The trouble lies in the fact that the hole is always larger than the drill size by which the hole is made. Even when well tooled, it can be 0.005 in. larger. If drilled only, the hole will be much larger and even drastically out-of-round.

It's at this point that tool engineering has to choose a specific punch size for the hole. This is done without knowledge of the hole's function. It's also done without the help of proper standardization. Product design sets the tolerances. At the same time, "high limit sizing" triggers a landslide of special punch point sizes.

That's not the end of the headaches, though. The next time that same hole is called for, another engineer is likely to specify an entirely new set of special sizes.

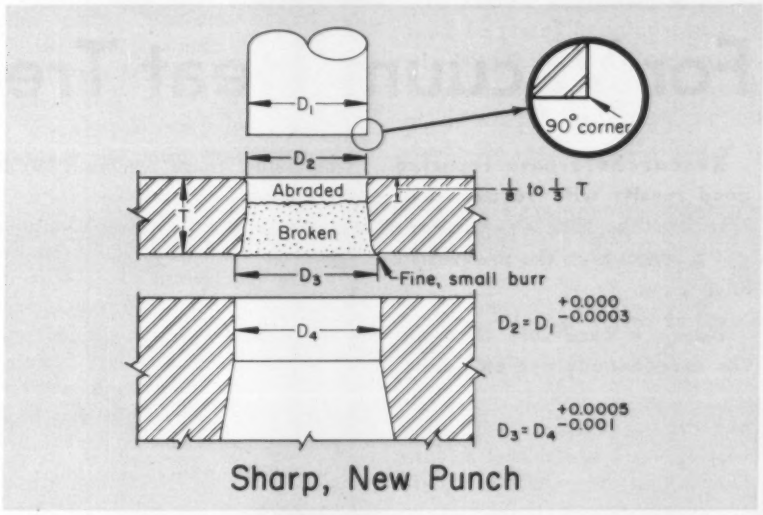
Silver Lining—Over the past few years, a statistical analysis was conducted to study punch usage. In each case, the reason for using the punch was also examined. The results point out that certain standard punches appeared in better than 8 out of 10 times.

The jobs included holes for fasteners such as screws, rivets and eyelets; press or slip-fit rods and shafts; similar holes with plating allowances; and clearances for protruding parts.

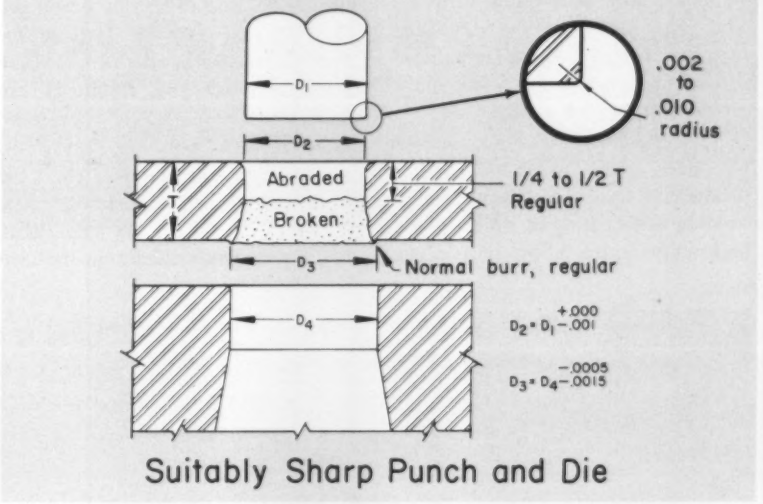
The popular punches were incorporated in a new standard by Dayton Perforators, Inc., Dayton. This line, called Proven Usage Punch Sizes, is mass produced at low cost. The simplified line is now a stock item with a major appliance maker. This company used to carry 196 high-limit punches. Now it carries but 17 diameters.

The company reports impressive savings from the punches. They are doing a better job with fewer problems, too. To sum up, they provide a common set of standards for product design, tool engineering and die building alike.

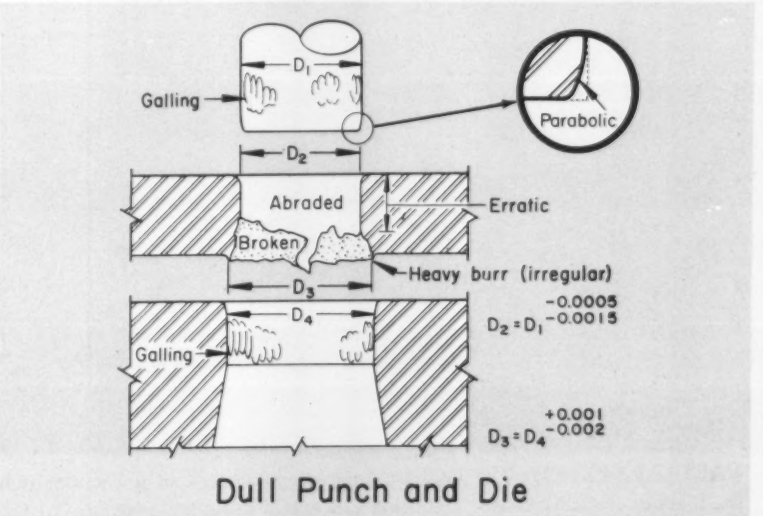
Punches Maintain Hole Size



Sharp, New Punch



Suitably Sharp Punch and Die



Dull Punch and Die

Production Eyes New Furnace For Vacuum Heat Treating

Researchers have reported good results with vacuum heat treating. The time has come to put a furnace on the production line.

Here's a candidate that will run economically and efficiently.

■ There are two main reasons for looking into vacuum heat treating. One is that the protective features of the vacuum itself prevent unwanted compounds from forming. The other concerns the degassing features of the vacuum. They dispel dissociate compounds which have already formed.

With these facts in mind, thought has been given to vacuum as a production tool. This includes heat treating and brazing of stainless and high-temperature alloy parts. The temperature range reaches 1750°F and higher.

Parts treated within vacuum furnaces in the lab have shown good results. Recent advances point up that the units are economical to heat, simple to control and safe to operate. Yet, the fact remains that little production equipment has been made to date. What has been produced has gone into government and defense work.

Cold Wall — Ipsen Industries, Inc., Rockford, Ill., has developed an insulated vacuum furnace for production work. It's a cold-wall unit that offers good results at sensible costs.

What can you get from the vacuum process that you can't get from controlled-atmosphere heat treating? First of all, the latter method depends chiefly on the laws of physical chemistry for its results. Vacuum heat treating depends upon the laws of physics.

In the vacuum process, dissociation pressures replace chemical reactions between elements and gaseous compounds. Suppose you treat stainless steel in a hydrogen atmosphere. Hydrogen will reduce oxides on the surface. However, it has no effect on other gases present in the near surface of the alloy.

Improves Properties—The vacuum system not only removes the surface oxides but also such gases as nitrogen and hydrogen. In the end, this feature helps improve mechanical properties.

During the past decade, many metals have been vacuum melted. The results show that vacuum melting does produce, in certain cases, better properties than those produced by the air melting method. Wouldn't it make sense to heat treat these same metals in a vacuum to prevent surface oxides and other contaminants from forming?

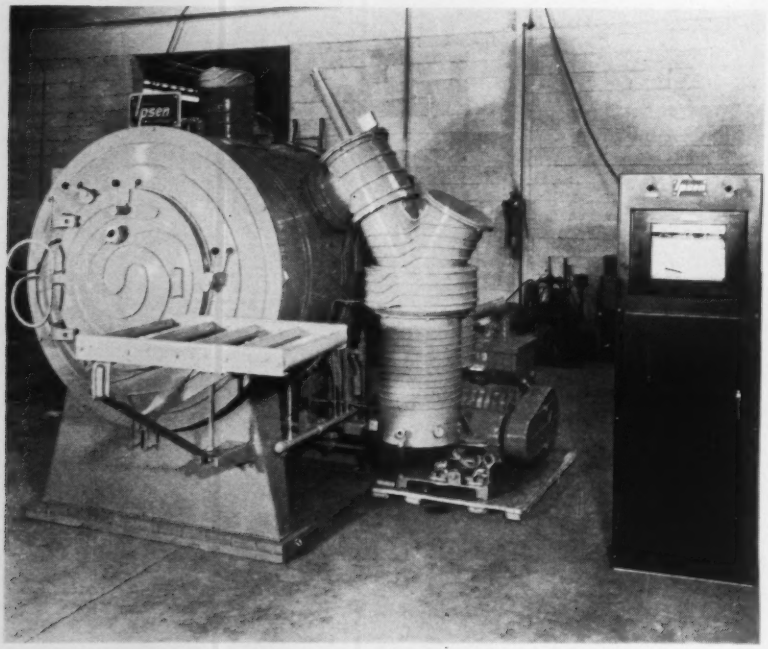
Little risk is involved in processing some of the more exotic metals in a vacuum furnace. Work comes out very bright with a bare minimum of distortion.

How about the resultant structure of, say, stainless? From a metallographical standpoint, the structure

How Tests Prove a Point

	Vacuum Treatment	Hydrogen Treatment
Hardness	41-43 Rc	39-41 Rc
Torque	200-220 in. lb	160-180 in. lb
Bend	25-35°	16-18°

Parts heat treated are AISI 410 stainless screws



VACUUM SYSTEM: The heat treating setup consists of a vacuum tight shell, roller hearth furnace, a cooling fan and a pumping system.

is the same, be it heat trea in a vacuum or in hydrogen. There is often a difference in impact strength and ductility, though. Vacuum-treated stainless is sometimes higher than the hydrogen-treated alloy.

Check the table of destructive tests as a guide to some advantages.

Batch-Type Unit — Ipsen's new vacuum furnace is a batch-type heat treating unit. It consists of a vacuum-tight shell, an electric heated roller hearth furnace, a cooling fan and a simple pumping system. The unit, called the VFC-300, has a leak rate of less than 50 microns Hg per hour. At this rate, it should take two years to leak from one micron to atmospheric pressure.

The new vacuum furnace operates automatically. After the load is placed in the furnace and the door is sealed, the temperature and the time "at heat" are set. As soon as the start button is depressed, the furnace goes through its automatic sequence.

What are some of the advantages of the new furnace? Reducing or neutral gases may be used. Included here are endo, hydrogen, nitrogen, argon, helium, propane, butane or natural gas.

No Escape—At maximum temperature, no sensation of heat is either felt or transmitted to the operator. The reason is that the unit is either water jacketed or scribed. When the door is opened, for either work loading or unloading, the furnace is cold. That means you avoid accidental dropping of hot parts and trays.

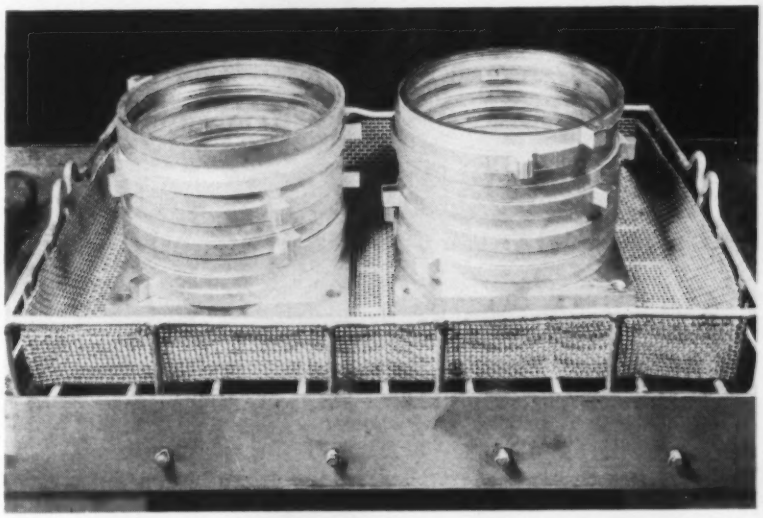
Since vacuum-heated parts obey the laws of physics, equipment to analyze chemicals or gases isn't even needed. The gases present in the furnace only serve as a cooling medium.

The cooling rate can be varied in many ways. It can be done either under different gases, under a vacuum, using different fan speeds or by program control of reduction of heat input through the temperature instrument.

Two Cycles—After completing one cycle, work can be started on another cycle without removing the parts. Stainless brazed at 2050°F, for example, can be cooled, then reheated to 1850°F, and fast cooled.

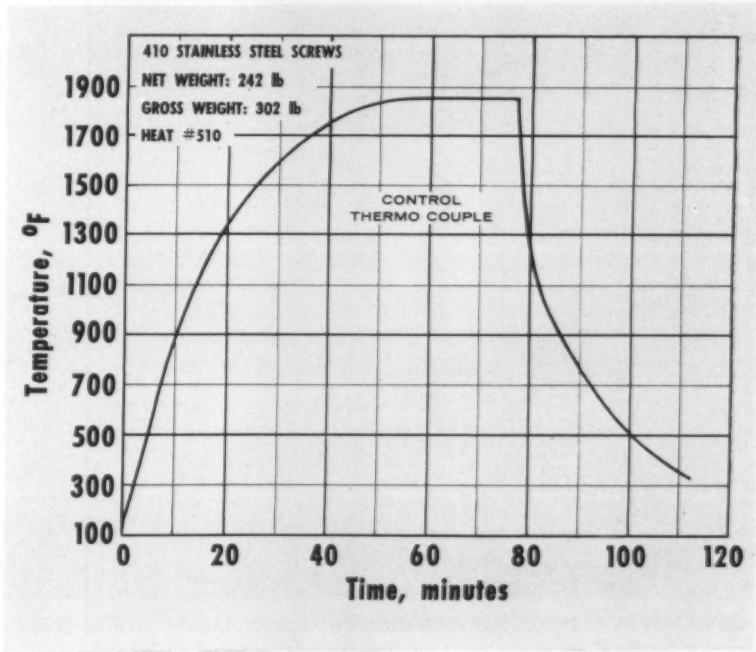
Each cycle starts with a cold furnace. In other words, the preceding cycle has no effect on the next heat.

A vacuum unit could, if so desired, be placed in an area such as an office. There is no flame curtain, no pilots, nor is there any burning of hydrogen. Also, there are no conditions present to produce dirt.



BRIGHT FINISH: Parts of Vascojet 1000 come out of vacuum heat treating furnace displaying an extremely bright finish.

Vacuum System Speeds Cycle



Are Communications a Headache In Your Management Program?

By **C. L. Reno**—President, Strategic Planning, Grosse Pointe, Mich.

Good communications prove out the effectiveness of any technical-management program.

It's easy to spot flaws in a poor program. Common signs: Confusion, overtime work and inability to define a problem.

■ Communications consume a large part of any technical manager's working day. If you break down the on-the-job activities of a metal-working executive, the results will probably amaze you.

The average executive spends many hours on the telephone, writing and reading memos, handling correspondence and digesting technical and management papers. Yet, by their own admissions, most of these key men aren't communications minded.

Consider the case of a small mid-western company. This company makes, packages and distributes chemical products used by engine manufacturers. The entire operation grosses about $500,000 per year.

All work is handled by a staff that never exceeds 25 people. When production requirements are down, the working force is reduced.

Inventory Flaws — The production manager at this company has a great deal of trouble with inventory control. His boss, the general manager, cites four flaws in the inventory area.

One flaw centers on raw-material supply. The production manager guesses at ever-changing raw-material needs. As a result, sometimes there's too much raw material on hand. Other times there isn't enough.

Another flaw in inventory control revolves around too many different kinds of supplies. Packaging materials are especially overstocked. Why? Because the production manager carries many inventory records in his head.

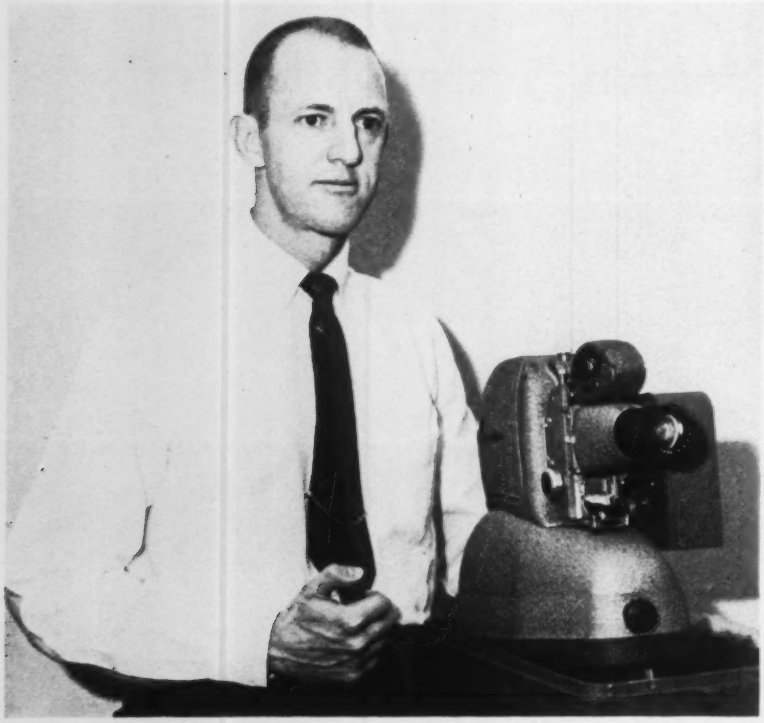
Verbal orders from the production manager to plant personnel constitute the third flaw. These verbal orders confuse the entire inventory picture. The production manager defends his policy. He says, "I don't have time to fool around with complex written orders."

Production Standards—The last flaw hinges on production standards. The general manager states: "We don't have proper production standards. This lowers the quality of our inventory."

Both the general manager and the production manager fall in the technical-manager category. Both men have management responsibilities which center on a technical product.

These men are overloaded with work projects. In fact, they work 60-70 hours per week. But these long hours don't pay the expected dividends. This is a position which is common to many technical managers who work for small companies.

It's unfortunate that these men



ADVANCED COMMUNICATIONS: To instruct classes in communications strategy, C. L. Reno uses modern methods to present his text.

spend many hours straightening out unnecessary problems. Most of these problems wouldn't have cropped up, if the fundamentals of communication were used properly and consistently.

Something Is Wrong — The general manager sums up the inventory problem quite simply. He says, "Our production manager has been running the (production) show for three years. He's excellent on details, but he must be missing some fundamentals.

"Our inventory problem shouldn't be so complex," he adds. "It's a major problem. And it's getting worse."

Confusion in inventory is always a sign of poor communications. In other words, the communications strategy doesn't fit the situation. No improvement is possible, until this strategy is thoroughly over-hauled. It must be redeveloped to suit actual plant conditions.

In this case, the company's organization chart gives the production manager final responsibility for inventory and production. The general manager has his hands full with technical sales and distribution of the product line.

Poor Strategy — The production manager's strategy is all wrong. He wrongly assumes a position as the center of importance. He doesn't understand his role as a communicator. And he isn't sure what a message should accomplish.

Inventory is a very sensitive spot. It involves people, things and policies. The inventory picture changes constantly. Poor communications confuse inventory records and create unnecessary problems.

Let's pinpoint a few of the things that can be done to clear up this inventory problem. We'll start with verbal orders.

When they fit the situation, verbal orders provide a good form of communication. However, such orders can really mess up inventory controls. The production manager needs to put his orders in writing. He can start by using a plain sheet of paper. Complex forms aren't

BALANCED FLOW: About 50,000 U. S. companies use a balanced-flow approach to improve their profit positions in technical-sales fields.

TABULATED DATA: Modern office machinery plays a major role in the application of basic internal communications such as business records.

MEETING OF THE MINDS: If you want to get your thoughts across, effective communication is a must. The conference room illustrates a common form of communications between management personnel.

needed in this small plant.

Maintain Balance — Next, the production manager should downgrade his present center of importance. Any technical manager must police this problem carefully. Remember, a communications system has to be balanced.

Communications fundamentals resemble the law of gravity. When an engineer ignores this law in designing moving assemblies he opens the door to unnecessary trouble. Ignoring the fundamentals of communications also creates problems.

What are communications? Consider formal paperwork. It consists of blueprints, releases, change orders, production schedules, routing slips, process sheets and material specifications. Formal paperwork also includes memos, reports and company correspondence.

Keep it Smooth — All of these forms of communication have one common point. Each involves the flow of information.

Now, let's consider telephone contacts. This form of communication meets wide use. But, too often, it's misused. When you place a call, you ask for or give out information. The person you call is your communications' target.

All communications involve the flow of information. If a technical manager wants to check the effectiveness of his communications, he should remember two key works. These words are flow and information.

Question Need—These two words develop some very powerful concepts. With this basic thought in mind, the manager must decide why a communication is needed. He should ask himself: What do I expect to accomplish?

His answer should be results. To obtain these results, the flow of information has to be effective.

Contact by telephone provides a concrete example. When you talk on the phone, you need to do three things to get results. First, you identify yourself. Then you identify your subject or product. Finally, you proceed with your actual message.

Here's a way to test yourself. When you handle an outside call do you always identify yourself? It's surprising how many technical managers expect their telephone contact to guess who is calling.

Danger Signals—It isn't hard to spot errors in communications strategy. Where there's smoke there's fire. If communications strategy doesn't fit the situation, it generates its own heat. This heat sends up smoke signals.

These danger signals take many forms. They include confusion, excessive overtime work and the inability to define the problem.

Proper communications offer many dividends. However, a good communications system is only as strong as its weakest link. Move slowly when you develop a new strategy for a given situation. Try it out before you go all the way.

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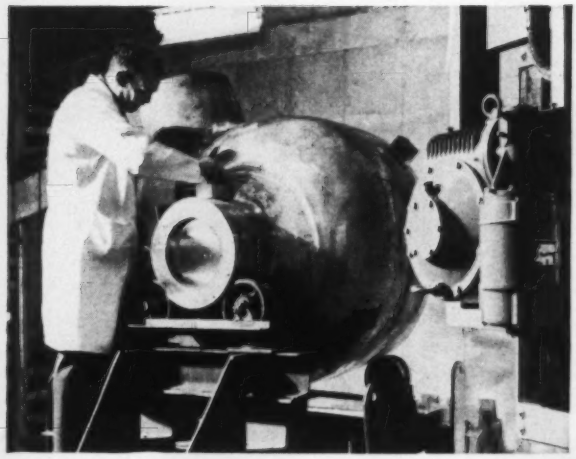
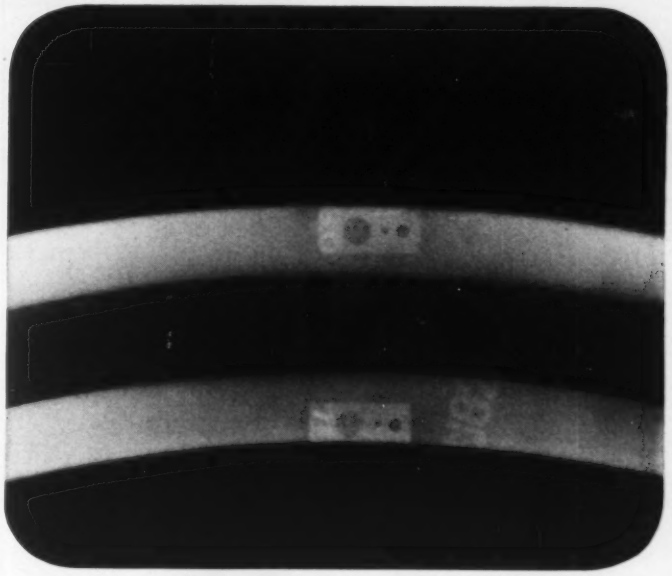


Navy Recruit passes its physical

Vitally important nuclear part must be sound beyond question. Electric Steel Foundry Company makes sure with radiography using Kodak Industrial X-ray Film.



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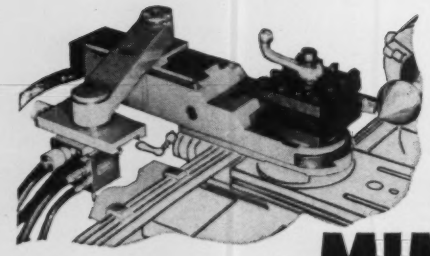

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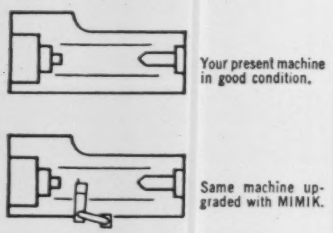
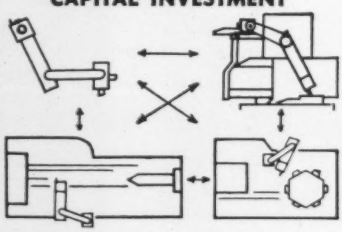


Maximum output with minimum outlay is obtained by the MIMIK METHOD.

2 STILL LOWER CAPITAL INVESTMENT



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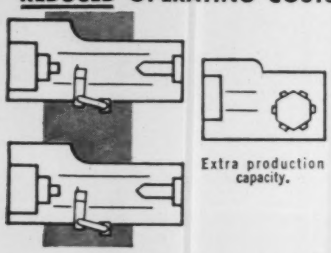
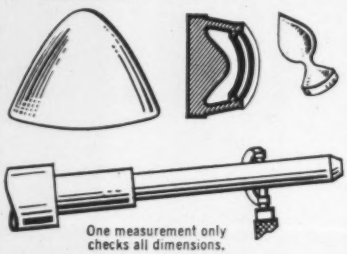


Two machines equipped with MIMIK Tracers will free your third machine for bonus production.

4 GREATER RANGE OF WORK



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PATENT REVIEW

New Patents In Metalworking

Adding an Agent

Method for treating ferrous materials, C. E. Bieniosek (assigned to Union Carbide Corp., New York), Dec. 6, 1960. In a process for adding a nodulizing or alloying agent to molten cast iron, the powdered material is entrained in a gas stream. For example, argon in the nodulization of cast iron, and injected through a graphite tube. Canadian No. 610,217.

Determines Thickness

Electrolytic cell, R. P. Frankenthal (assigned to U. S. Steel Corp., Pittsburgh), Nov. 15, 1960. Design for an electrolytic cell, adapts for use in determining the thickness of the oxide coating on a specimen of sheet metal. No. 2,960,455.

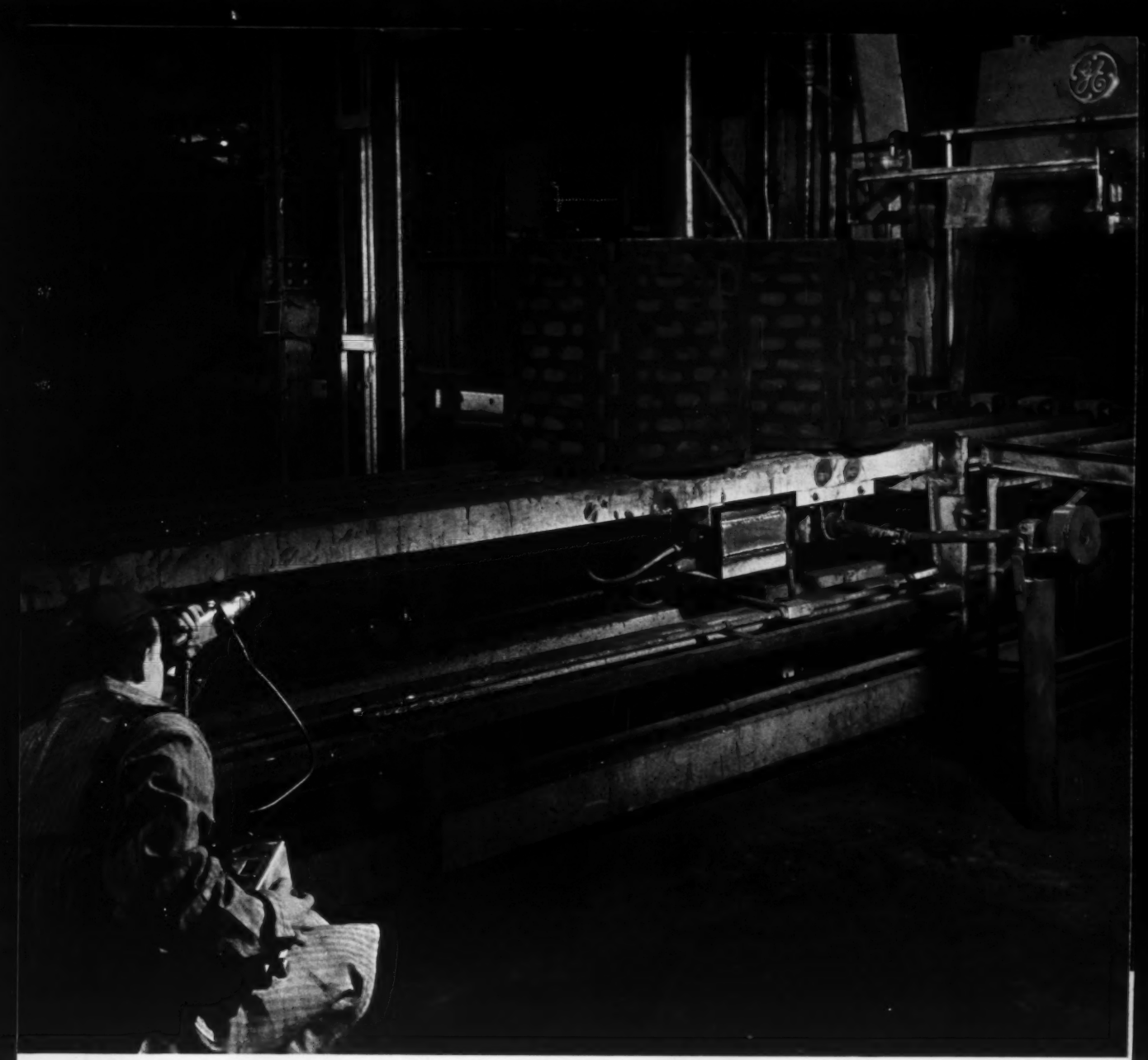
Ore Preparation

Improvements in and relating to the preparation of ores, A. Subervie, Nov. 9, 1960. In the balling or nodulizing of fine taconite or other ore fines, particles of limestone or coke are admixed with a tar emulsion. Then, ore fines are projected into the mixer where they adhere to and enlarge the "seed" particles. British No. 853,532.

Making Steel

Apparatus for continuous process of steel making, W. Morrill (assigned to General Electric Co., a corp. of N. Y.), Nov. 29, 1960. Apparatus and continuous process for making steel begins at the ore smelting stage. It carries through intermediate refining and purifying stages to the final solid steel product. No. 2,962,277.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.



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HEAT
from General Electric

How General Electric service after start-up saves you heat processing dollars

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Example: General Electric helped plan the rebuilding of high-temperature copper brazing equipment for an Ohio customer. G.E. provided new brickwork, heating elements, hearth material, and supervised installation. This planned maintenance helped complete the job with minimum interruption to production.

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Self-Locking Bolts

A four-page engineering data bulletin concerns itself with self-locking bolts and screws. Contained in the bulletin are design characteristics of the bolts and screws. Temperature and strength data are also given. (Long-Lok Corp.)

For free copy circle No. 9 on postcard

Research Facilities

A 20-page brochure describes the technical capabilities of the manufacturer. Complete information is provided on research, development, production and field and technical data services. The brochure also describes in detail the company's

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FREE LITERATURE

modern physical equipment and facilities for prototype fabrication. (Singer-Bridgeport)
For free copy circle No. 10 on postcard

Clamps, Supports

Corrosion-resistant clamps, supports and holders are described in a 16-page catalog. (Fisher Scientific)
For free copy circle No. 11 on postcard

Reduced Handling Cost

With an eye towards cost cutting, a bulletin explores materials handling. It points out the often-forgotten areas of storage, transfer and control. It gives specific methods for reducing costs in these phases of handling. (The Rapids-Standard Co., Inc.)
For free copy circle No. 12 on postcard

Nondestructive Testing

Described in a 12-page bulletin is a line of ultrasonic testing equipment; portable industrial X-ray and magnetic particle inspection equipment and supplies. (Sperry Products Co.)
For free copy circle No. 13 on postcard

Roll Formed Shapes

A 36-page bulletin shows roll-formed shapes in actual size. The bulletin describes the techniques used in roll forming shapes from aluminum, brass, copper, zinc, titanium, galvanized, stainless and carbon steels. (Roll Formed Products Co.)
For free copy circle No. 14 on postcard

Optical Maser

A booklet describes the theory and design of a solid state optical maser. The eight-page booklet bears a full-color cover picture of an operating maser emitting a pulse of coherent light. (Bell Telephone Laboratories.)
For free copy circle No. 15 on postcard

Power Transmission

For those concerned with power transmission problems, a liberally illustrated 22-page catalog describes a dual torque locking and positioning device. Components and construction, operating principles, design advantages and installation are discussed. (Formsprag Co.)
For free copy circle No. 16 on postcard

Explosive Valves

Reusable explosive valves are illustrated and described in a four-page bulletin. The patented line features reusable bodies and replacement kits. (Conax Corp.)
For free copy circle No. 17 on postcard

Handles Containers

In two colors, a six-page brochure describes five heavy-duty fork-lift trucks. The trucks are designed to handle van-sized shipping containers. Dimensions and operating advantages of the trucks are explained in drawings and text. (Clark Equipment Co.)
For free copy circle No. 18 on postcard

Ultrasonic Cleaning

Ultrasonic cleaning systems are described in a bulletin. Various systems are illustrated with their respective specifications. (Acoustica Assoc., Inc.)
For free copy circle No. 19 on postcard

Air Compressors

For industrial use, air compressors from 25-100 hp are illustrated in a bulletin. Fully described are all important features. The brochure includes a complete list of dimensions, weights and specifications for the units. (Clark Bros. Co.)
For free copy circle No. 20 on postcard

Circular Form Tools

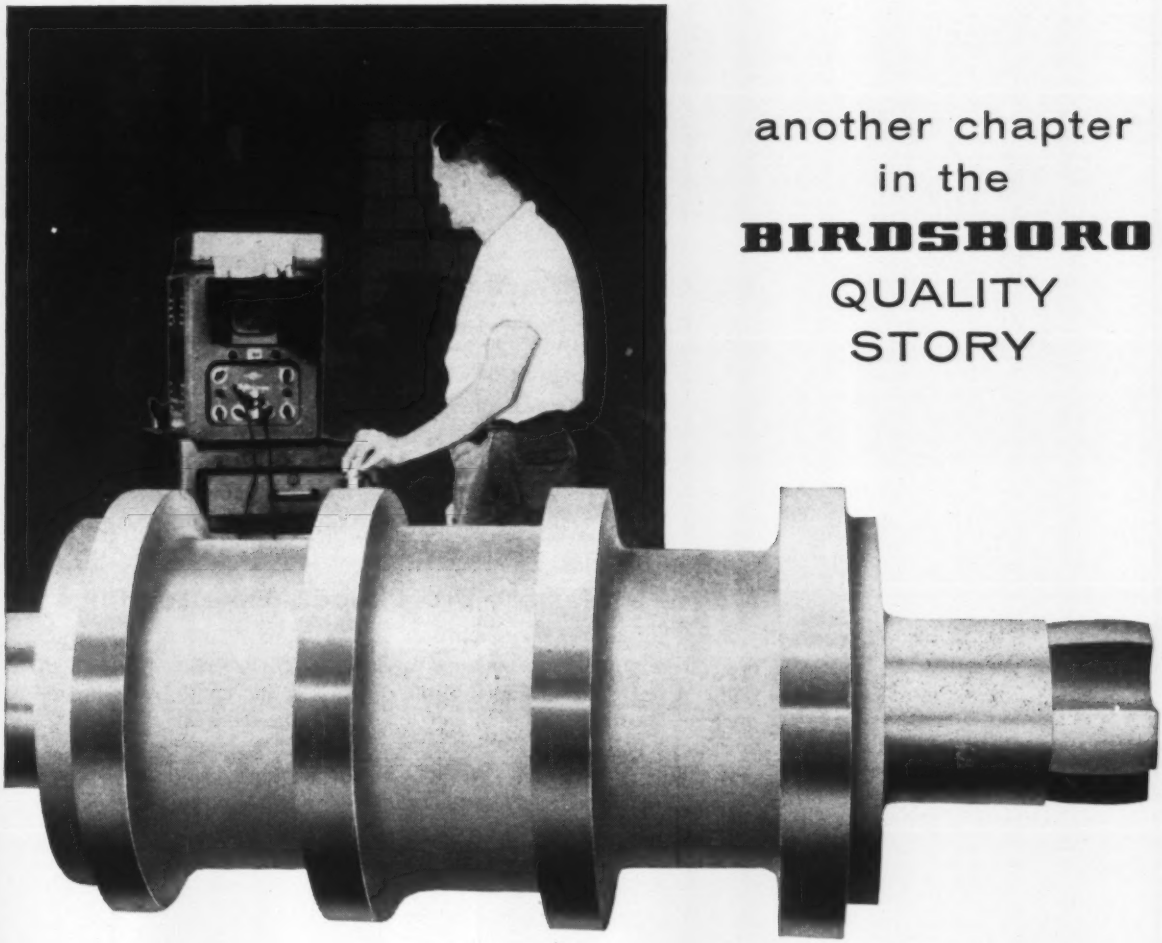
Standard circular form tools and blanks are covered in a 20-page catalog. The tools and blanks are for use in automatic screw machines. (The Somma Tool Co., Inc.)
For free copy circle No. 21 on postcard

Rust Removing

Tested and proved procedures for preventing and removing rust, under almost any condition, are detailed in a bulletin. (Oakite Products, Inc.)
For free copy circle No. 22 on postcard

Pinhole Detector

A bulletin describes a pinhole detector. Included is a description of a new non-contacting photoelectrically guided shutter. (Franklin Electronics)
For free copy circle No. 23 on postcard



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QUALITY
STORY

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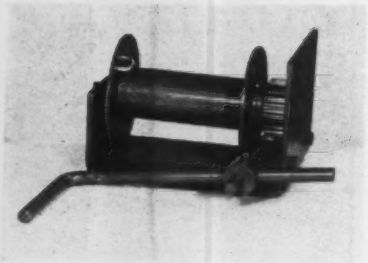
STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • ROLLS • ELECTRIC STEEL CASTINGS: Carbon, Low Alloy and STAINLESS STEEL

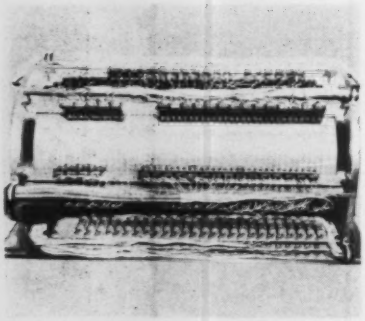
New Materials and Components



Worm Gear Winch Has Strength and Dependability

Constructed of all steel, a worm gear winch weighs only 17 lb. Its pulling capacity is 2500 lb with a 25:1 ratio steel cut gear and hardened steel cut worm. The winch holds the load in any position. It can do this without a brake. The handle's length is adjustable. Drum capacity is about 250 ft of 3/16-in. cable; 120 ft of ¼-in. cable and 45 ft of ⅜-in. cable. The winch easily adjusts for a vertical or horizontal mounting. It can be used as a hand winch or with an electric motor. (Hawkeye Industries)

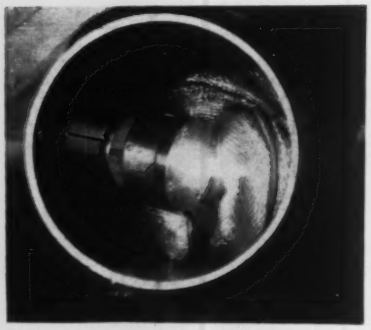
For more data circle No. 25 on postcard, p. 93



Magnetic Memory Drum Reads While Stationary

Suited to the program control of multiple-cutting machine operations, a magnetic memory drum presents recorded information. It does this regardless of whether it is in motion or is stationary. Thus, it can present cutting coordinates on a step-by-step basis. It can remain stationary while the associated machine tool completes a cut. In the stationary condition, it continuously presents information for comparison and control. At the end of a cut, the drum steps to its next position corresponding to the end of the next cut. The drum then signals the new co-ordinates to the machine. This is continuous. (Consolidated Controls Corp.)

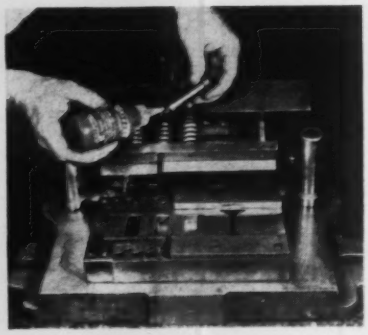
For more data circle No. 26 on postcard, p. 93



Small Gun Sprays Previously Inaccessible Surfaces

An arc-plasma hand spray gun is less than 2-in. long and 1½-in. in diam. The small-size gun makes possible the spraying of materials onto surfaces previously thought of as inaccessible, because of the size of the gun. The gun attains an operating efficiency of more than 60 pct. This represents the conversion of electrical energy to heat. The spray gun can be used with standard company consoles and carries a 200-hour electrode life guarantee when used with argon. Besides coating surfaces, the guns may be used in testing materials, synthesizing chemicals, ablation studies and welding or cutting high melting point materials. (Plasmadyne Corp.)

For more data circle No. 27 on postcard, p. 93



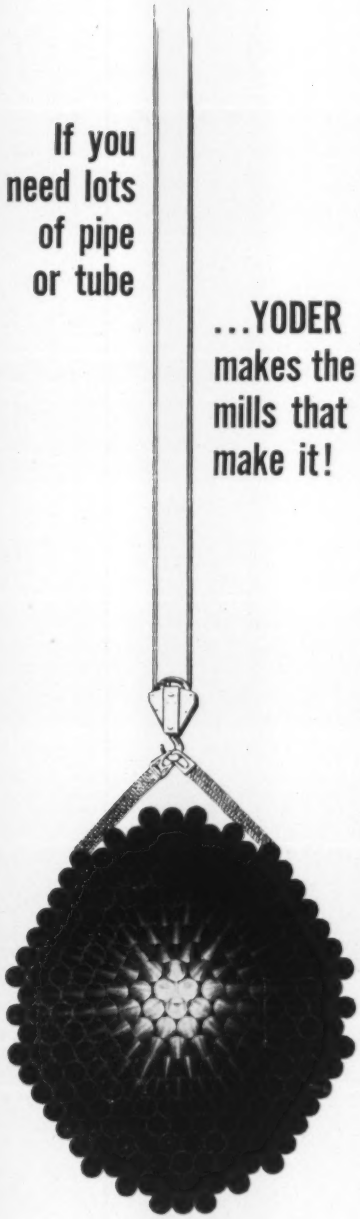
Liquid Plastic Locks Every Size Screw

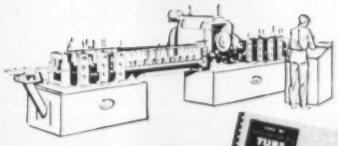
The use of a new liquid plastic eliminates the familiar problem of loosening stripper bolts in press tools. The sealant locks cap and shoulder screws in place, holding them secure against all shock and vibration. Use of the sealant method of locking screws allows the user to take full advantage of precision quality heat-treated shoulder screws. No softening of the screws is required to add the sealant locking elements. This results in longer tool life and better alignment. Method of treatment is simple. The sealant is applied to either the male or female threads of cleaned parts. Assemblage is in the usual manner. (American Sealants Co.)

For more data circle No. 28 on postcard, p. 93

If you need lots of pipe or tube

...YODER makes the mills that make it!





For complete information on YODER Pipe or Tube Mills . . . write for the fully illustrated, 88 page YODER Tube Mill Book . . . it is yours for the asking.

THE YODER COMPANY
5510 Walworth Avenue • Cleveland 2, Ohio

ENGINEERING YODER MANUFACTURING
PIPE AND TUBE MILLS
(ferrous or non-ferrous)

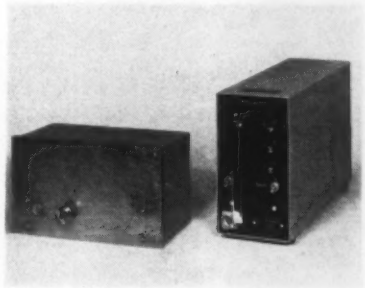
Hydraulic Motor

For accurate control at all speeds, a rotating, vane-type hydraulic motor features smooth, pulseless, noiseless operation. it offers all this even at low speeds. The motor provides practically 100-pct torque at stall and infinitely-variable speed. The motor also gives symmetrical reversibility, with low rotating inertia. It connects directly to load for space-saving and more-power efficiency. (Hartmann Mfg. Co.)

For more data circle No. 29 on postcard, p. 93

Gives Shaft Position

Sealed in a corrosion-proofed aluminum case, an analog-to-digital converter expresses the angular position of a shaft. It does this in the form of electrical outputs suitable for energizing a remote digital-type indicator or control instrumentation. The shaft couples with



the converter so that either 100 or 1000 revolutions will produce the full range of outputs. The output circuit consists of four decades of 10 circuits each. Electrical representation of any number from 0-9999 is possible. (George Kelk Ltd.)

For more data circle No. 30 on postcard, p. 93

Rod Seals

Protected by a backup washer of carbon-impregnated Teflon, rod seals reduce cost and time required for cylinder care and replacement. Fluoroelastomer, highly resistant to fluids and high temperature, forms the rod seal. The seals are incorporated in the company's line of cylinders. The rod seal backup washer combination maintains effective resiliency during continuous

THE FREEDOM DIMENSION

. . . is shape flexibility

The investment casting process allows a new *freedom of design* . . . in shape . . . in materials. You can now design for function—the way you want the part!

This functionally designed instrument chassis was poured as an investment casting without design compromise. Dozens of expensive and complicated machining operations would otherwise have been required. Check your design with Hitchiner—in many cases you can buy *just what you want.*

Write for complete technical and facilities information.

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product development does NOT start at the drawing board...

In-plant research and development programs tend to concentrate primarily on internal manufacturing improvements — and may not fully explore the fertile areas of product and market development. The creation of new products and markets for the construction industries requires a well-rounded organization of engineers, experienced in all phases of construction planning, design and field supervision.

The Cerand Corporation is a practical-minded research and development organization — made up of men with extensive on-the-job knowledge of the techniques, equipment and materials used in the construction industries.

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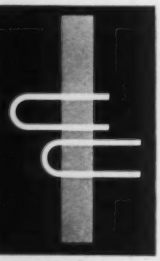


the cerand corporation

Dept. 33

285 Columbus Avenue Boston 16, Mass.

DESIGN DIGEST

cylinder operation at 400°F and higher. Flared lips on the iron-oxide-colored rod seal maintains a positive seal at low pressure. (Hydro-Line Mfg. Co.)

For more data circle No. 31 on postcard, p. 93

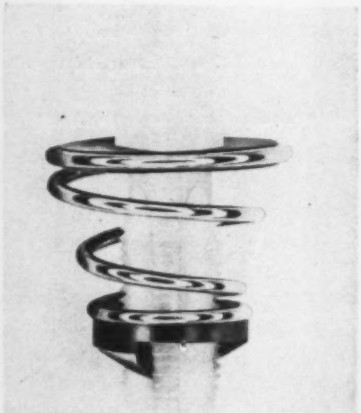
Extra-Length Drills

High-speed steel, extra-length drills serve well for operations where inaccessibility is a problem. It also functions well for very deep holes. Diameters range from number 52 wire gage to 1½-in. Overall lengths go to 23½ in. (Whitman & Barnes)

For more data circle No. 32 on postcard, p. 93

Deburring Tool

In a single operation, a tool taps and deburrs pipe threads. It fits all makes of pipe taps in sizes from ⅛-1 in. The bit easily slips on the



pipe tap itself in a matter of seconds. The bit can be used with either friction type or lead screw type tappers. (Vernon Devices Inc.)

For more data circle No. 33 on postcard, p. 93

Core Solder

Hydrazine activated core solder combines the advantages of standard hydrazine flux while providing an integrated ratio of flux to solder for proper wetting. The core solder can be used in soldering all electrical and electronic equipment. The non-acidic flux leaves no resin residue to support fungus growth. It is non-corrosive and non-hygroscopic. It vaporizes completely at soldering temperature. The following metal surfaces can be soft-soldered with the new flux: copper, brass, hot tin dipped, tin plate, solder plate, cadmium plate, zinc, silver plate and nickel plated brass among others. (Fairmount Chemical Co.)

For more data circle No. 34 on postcard, p. 93

Tungsten Carbide

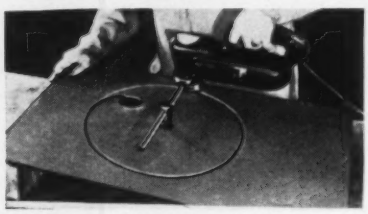
Laboratory equipment, incorporating a tungsten carbide vial, reduces the problem of grinding and pulverizing hard materials. Con-

tamination is negligible. The carbide grinding vial, with a carbide ball, practically eliminates container wear when the vial is violently shaken. (Kennametal Inc.)

For more data circle No. 35 on postcard, p. 93

Cuts Circles Fast

Designed to be added to a portable nibbler, an adjustable attachment permits rapid cutting of circles up to 48 in. in 11-gage steel. Constructed from machined parts, the



attachment can be used with all standard company air or electric nibblers. The extension arm attachment adds to the versatility of the nibbler. (Fenway Machine Co.)

For more data circle No. 36 on postcard, p. 93

Vacuum Baffle

For use with existing vacuum systems, a thermoelectric baffle eliminates the need for mechanical refrigeration. It is noiseless, not

Memo to a Man of "Parts"

The number of different parts made from Roebling High Carbon Specialties, Flat Wire and Spring Steel are close to countless.

Some things you can count on, though, are the consistent dimensional and mechanical uniformity you get with any Roebling High Carbon Specialty. They are the qualities that contribute to speeding *your* production and cutting *your* costs.

They are high qualities that make for high values. Next time you need flat wire or spring steel, specify Roebling. For information, write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, N. J.

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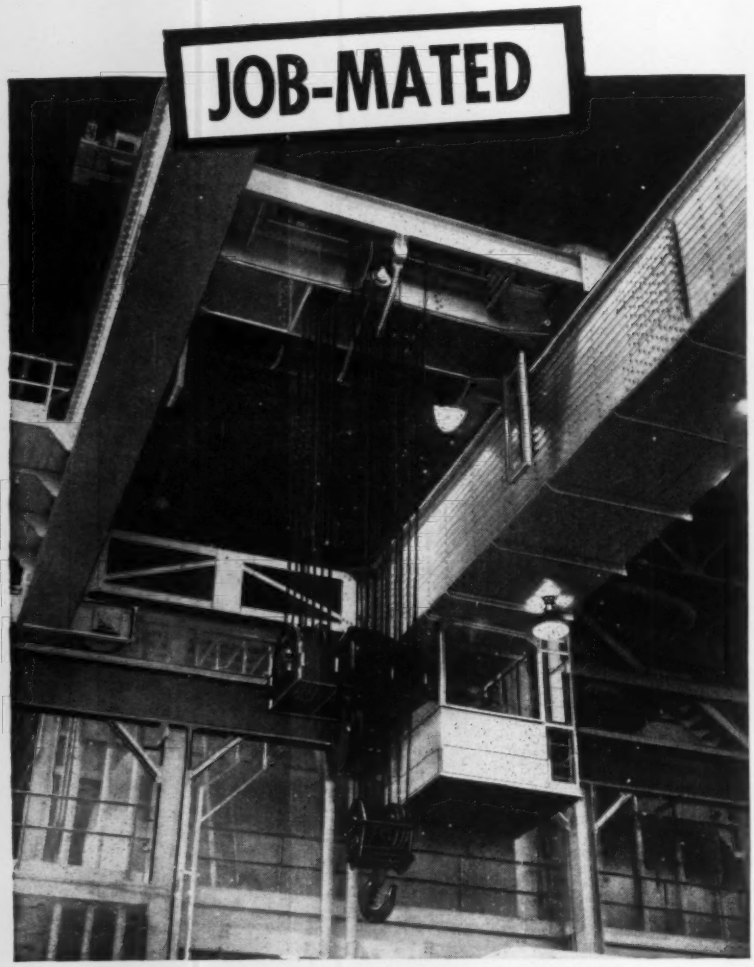
Roebling... Your Product is Better for it



The PERFECT FIT!

"Job-Mated" cranes by Shepard Niles fit the job picture perfectly because each one is built to meet exact on-the-job conditions. The ideal combination of capacity, clearance, speed and controls is specified to assure years of highly efficient, economical service, and to keep wear and maintenance to a minimum.

With the most complete line of quality-built cranes in America to choose from, you can be sure you have the **right** crane for the job—a **"Job-Mated"** crane by Shepard Niles—from 500 lbs. to 500 tons.

For further information on Shepard Niles cranes, and how they can improve your plant operation, write for a descriptive bulletin, and ask to have a Shepard Niles representative call at your convenience.

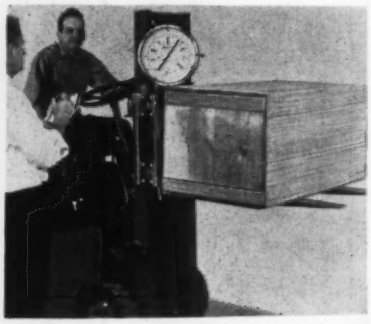
SHEPARD NILES
CRANE AND HOIST CORPORATION
1406 Schuyler Ave., Montour Falls, N.Y., U.S.A.

DESIGN DIGEST

having any moving parts. The thermoelectric baffle employs standard semiconductor elements as the basic cooling means. They come in standard sizes ranging from 2-32 in. in diam. (General Thermoelectric Corp.)

For more data circle No. 37 on postcard, p. 93

Lift-Truck Scale

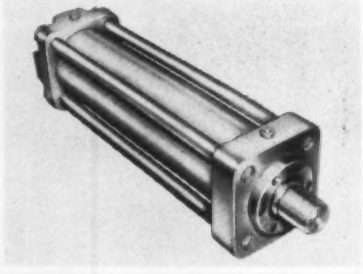


Quickly installed on any make of fork truck, a scale unit serves the need for an accurate, mobile platform scale. With this unit, it is possible to check weight in both receiving and checking departments. Parts or materials can also be weighed for closer production control. Materials can be weighed for closer process control. With a reverse-reading dial, the mobile platform scale can be used for batching. This scale is a hydraulic, compression cell-type unit. Scale capacities range from 1000-6000 lb. (Hydroway Scales, Inc.)

For more data circle No. 38 on postcard, p. 93

Hydraulic Cylinders

Heavy-duty, 10,000 psi hydraulic cylinders have a choice of stroke length. With capacities of 50, 75, 100 and 150 tons, the cylinders



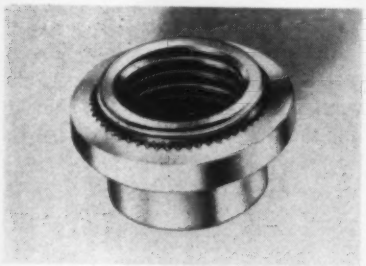
have bore sizes of 3¾, 4½, 5⅛ and 6⅜ in. Construction features are: Quality heat-treated alloy steel

piston rods ground and polished 10-15 micro finish; Heavy wall cylinder shells bored and honed to 10-15 micro finish. (Owatonna Tool Co.)

For more data circle No. 39 on postcard, p. 93

Swage Nut

Self-locking, a high-strength lock nut averages only one-half the weight of similar fasteners. The nut has a positive lock to prevent mating bolts from loosening under vibration. Spring action of three sided collar reduces thread diameter. It holds the bolt securely wherever wrenching stops. The

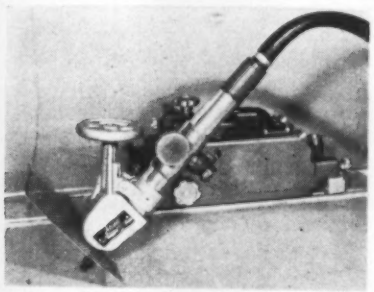


swage nut is a simple method of attaching load-bearing threads to thin-sectioned assemblies. (Standard Pressed Steel Co.)

For more data circle No. 40 on postcard, p. 93

Automatic Travel Torch

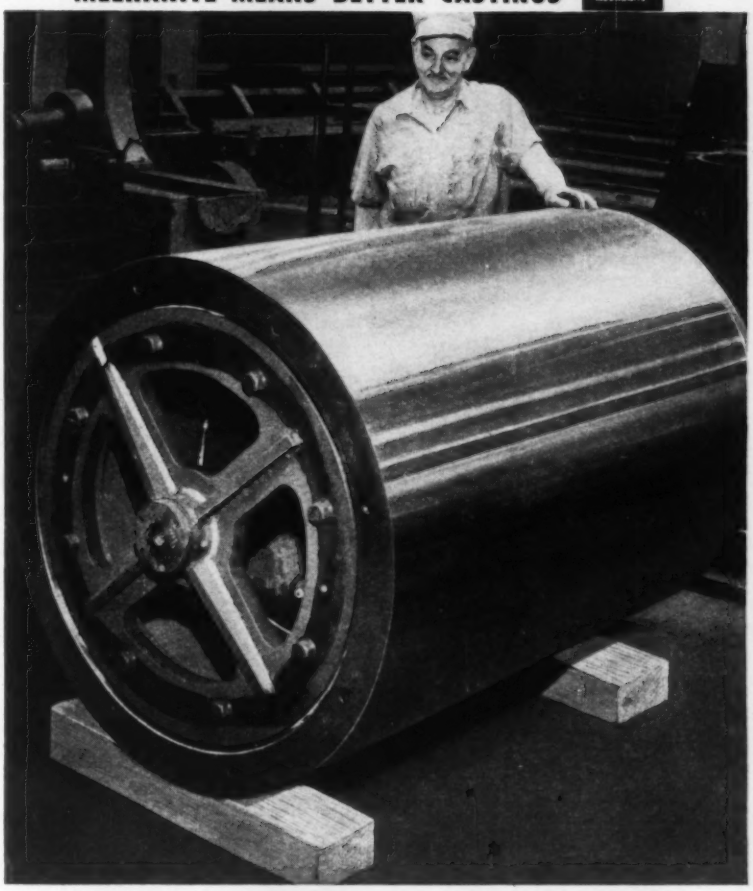
A semi-automatic torch produces a smooth, machine-like groove or bevel in heavy plate. Its function is gouging for weld preparation, deseaming and other similar operations. Smooth, straight, fast cuts can also be produced when cutting stainless steel or other special alloy plates. A minimum heat input results, eliminating warpage or distortion. The torch mounts on a



standard cutting machine. It uses electrodes ranging from ¼-⅝ in. (Arcair Co.)

For more data circle No. 41 on postcard, p. 93

MEEHANITE MEANS BETTER CASTINGS®



Meehanite Mandrels Reduce Tooling Costs

This 44" diameter by 64" long cylindrical mandrel weighs 8000 lbs. and is used for hydrospinning high strength missile casings. Many such Meehanite mandrels are now being used with good results to form parts for airframes, aircraft engines, missiles and other industries.

If you are producing conical, cylindrical and contoured parts by the power spinning process, Meehanite mandrels, that are machined, heat-treated to a hardness of about 50 Rockwell C and ground, offer many design, economic and production advantages.

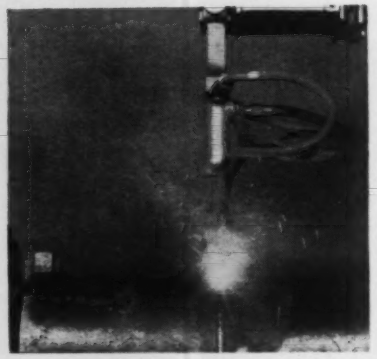
High quality Meehanite mandrels reduce tooling costs by combining dimensional accuracy, high strength, fine surface finish and long service life.

For more information, send for your free copy of our new brochure on Meehanite Mandrels. Write to Meehanite Metal Corporation, 714 North Avenue, New Rochelle, New York.

MEEHANITE METAL

MEEHANITE CASTINGS ARE MADE ONLY BY MEEHANITE FOUNDRIES.

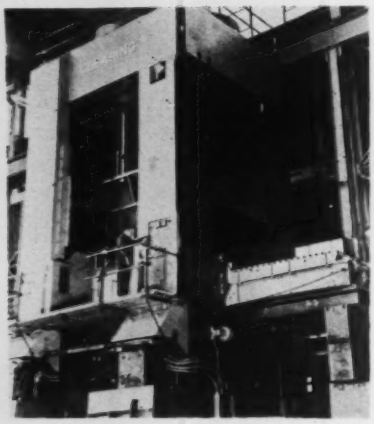
New Equipment and Machinery



Roll Welding Process Needs No Ring Nor Bead

For the fully automatic roll welding of pipe, a process eliminates the need for a manual stringer bead or a backing ring. The welding system employs carbon dioxide as the shielding gas. It successfully butt welds pipe, laying the stringer bead automatically without the use of a backing ring. The welding equipment includes a wire feeder coupled to a specially designed constant-voltage motor generator welder. Filler wire is fed to a fixed welding torch for flat position or roll welding. It may also be fed to a lightweight hand torch for semi-automatic applications. The water-cooled torch contains the current pick-up tube and the electrode wire. It also directs the CO_2 shield into the welding zone. (Hobart Bros. Co.)

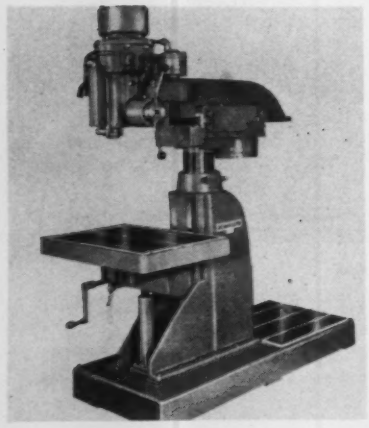
For more data circle No. 45 on postcard, p. 93



Press Consists of All-Welded Steel Design

Of fully-enclosed design, a press incorporates many features. It has a two-speed clutch, cushions with hold down devices and hydraulic locking devices. Its moving bolsters make for quick die changes. The press also features overloads and die space lighting. Capacity of the inner slide is 600 tons—outer slide, 400 tons. The inner and outer slide have four points of suspension. The press bed measures 84 in. (front to back) and 108 in. (right to left). This is the unobstructed die space clearance. The stroke of the inner slide is 38 in. That of the outer slide is 27 in. Adjustment of the inner and outer slide is 24 in., by motor. The bed has two openings —one cross rib—measuring 63 in. (front to back) x 93 in. (right to left). Location of the press drive is in the bottom. The type of clutch is dual speed. Type of gibbing is standard. Pneumatically operated flywheel brakes are solenoid operated. (U. S. Industries, Inc.)

For more data circle No. 46 on postcard, p. 93



Radial Drilling Machine Has Heavy-Duty Range

Filling the gap between sensitive upright drills and a large radial drill, a radial drilling machine drills and taps a quantity and variety of holes. A housing supports the radial drill column. This housing provides longer bearing support and inherent added rigidity. The radial arm, or ram, swings through 360° for positioning at any location over the 20- x 40-in. work table. This also can be done over the 25- x 42-in. work platform at the rear of the machine. This platform finds good use when taller and heavier workpieces are to be drilled. The column locks from rotating. It can be moved up or down 12 in. in column housing. This gives 54-in. maximum and 6-in. minimum from spindle to work surface. A patent-applied-for feature allows the operator to do deep-hole drilling up to 22-in. deep. The direct gear drive provides 16 spindle speeds in four optional ranges from 34-1640 rpm. (I. O. Johansson Co.)

For more data circle No. 47 on postcard, p. 93

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Airco's new silver alloy wire, AIRCOSIL FLUXCOR, is the only wire available which has the flux incorporated within the core of the filler metal wire. It reduces or eliminates the time normally needed for separate fluxing of parts. It minimizes flux inclusions. It gives exactly the right amount of flux every time for a good strong joint — no more weak joints because of poor fluxing — no more wasted fluxing.

In addition, Aircosil Fluxcor minimizes the danger of voids resulting from improper pre-cleaning. It can be used readily by operators who have very little brazing experience. Aircosil Fluxcor has an alloy content which is equivalent to a 3/64" diameter solid brazing wire.

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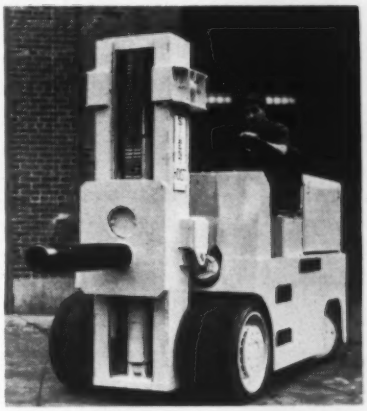
Metal Finishing

A dual-spindle, economy lathe handles polishing, buffing, deburring and brushing jobs in half the normal time. Time - consuming transfers to a second fixture are eliminated. Less floorspace is required. The lathe employs two separate top-quality, motor-driven spindle assemblies. One simple, sturdy base holds them. When both wheels are used for the same operation, production is doubled. If one wheel is used for cut-down, the other for coloring, the result is a finished job with only one fixturing of the part. (Murray-Way Corp.)

For more data circle No. 48 on postcard, p. 93

Mill-Type Truck

With ram or fork tines, a mill-type truck offers a design for continuous production handling. Incorporated in the truck are these features: planetary axle, automatic



transmission, power steering and narrow width. The truck also has a short turning radius. The truck comes in five sizes: 10,000-30,000 lb—gas, diesel or LPG. (Silent Hoist & Crane Co.)

For more data circle No. 49 on postcard, p. 93

Wire Dispenser

The wiring of harnesses, control panels and electronic assemblies is speeded up by a wire dispenser. The unit consists of ten high-impact plastic tubes held in a rack. Wires of any desired length can be clipped in the tube for one-at-a-time withdrawal. The dispenser saves wiring time because it locates all wires in

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Easy troughability, flexibility, super-strength synthetic cords, high wear-resistance—make R/M Conveyor Belts ideal wherever long lifts at high tensions are required. The installation shown here, for example, was a quarter-mile conveyor with a lift from pit to surface loading station nearly as high as a 40 story building. An R/M conveyor belt made an exceptional record on this rugged haul. There's an R/M heavy duty conveyor belt for every materials handling requirement . . . each engineered to haul fuller, heavier loads—and *last longer*. With proper engineering, for example, you can increase hauling capacity up to 60% with Ray-Man Conveyor Belt and 45° idlers! Ask your R/M representative about other R/M Conveyor and elevator belts, about advantages of extra-flexible, double compensated, rip-resistant Ray-Man . . . about Homocord, the extra-cushioned belt for unusually abusive shock loading conditions, or about the Wedlok metal fastener splice which avoids vulcanizing splices. Any R/M Conveyor Belt with "XDC" cover means extraordinary resistance to wear and tear, longer life—"More Use per Dollar." Write for Bulletin M302 and Catalog CB25.

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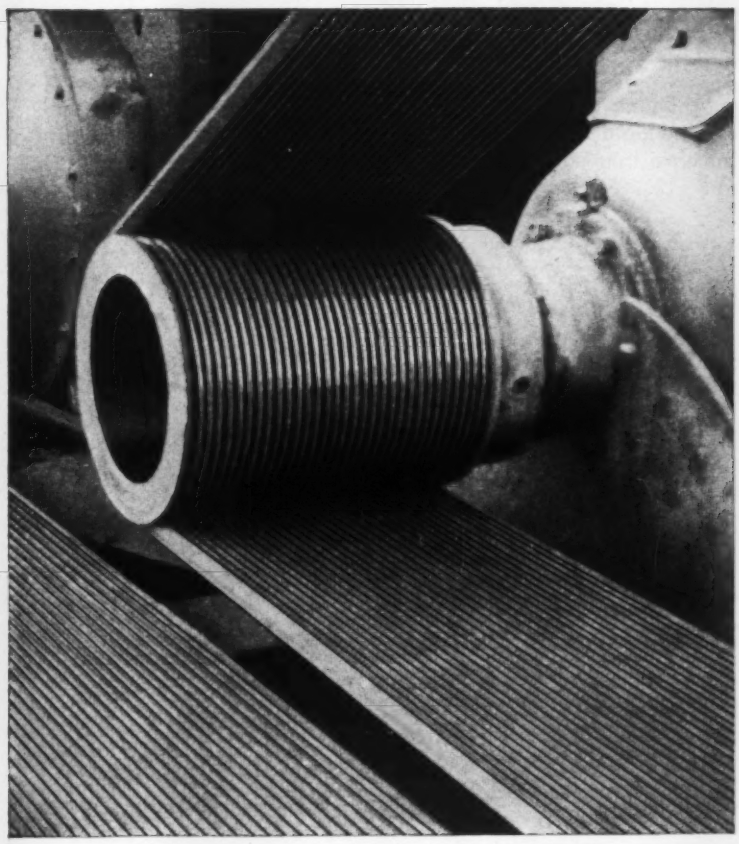
MANHATTAN RUBBER DIVISION, PASSAIC, NEW JERSEY



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in Less Space

. . . with Reliability

A *single unit* V-ribbed belt across full width of the drive-sheave—*not* an assembly of V-belts—enables patented Poly-V to deliver much *more* power in the same space as a V-drive . . . or *equal* power in much *less* space! Single unit belt design also eliminates belt "length matching" problems . . . minimizes equipment down-time and belt replacement costs. Belt speed ratios remain constant from *no* load to *full* load to provide the smoothest running, coolest running—*longest wearing* drive you can install. Maintain groove shape. Just two sections of Poly-V Belt meet every heavy duty power transmission requirement. Write for Bulletin M141, or call your R/M Distributor.

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- PRECISION BUILT
- NO PRE-SET TWIST—WILL NOT KINK
- INSEPARABLE TUBE-TO-COVER BOND
- UNIFORM INSIDE AND OUTSIDE DIAMETERS
- EASIER, SAFER COUPLING

Strong, lightweight, and "flexible as a rope"—Homoflex is the easiest handling hose and lasts longer. Made in types for air, water, other fluids and gases. Ask about other types of R/M rubber hose for your job applications. Write for Bulletins M620 and M694.

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NEW EQUIPMENT

optimum position for the operator. It saves handling time by using the same container from cutter to storeroom to bench. (Products for Industry, Inc.)

For more data circle No. 50 on postcard, p. 93

Melting Tanks

Directly and indirectly heated, a line of industrial heating tanks features full insulation and fused link closing device. It has an easy-reading thermometer. Sizes are from 1-695 gal and can be heated by electricity or any type of gas. (Aeroil Products Co., Inc.)

For more data circle No. 51 on postcard, p. 93

Environmental Chamber

Into a compact 3 cu ft chamber is incorporated high and low temperatures—altitude and humidity. Temperatures from —100° to 500°F are accurately controlled to ±2°F. They provide a thermal capacity of 1200 btu/hour at —100°F. Pulldown from ambient to —100°F takes 60 minutes. Warmup to +500°F takes 60 minutes. In 30 minutes, the unit attains 100,000-ft altitude—150,000 ft in 60 minutes. Humidity range is 20 to 95 pct, ±5 pct at temperatures between +35° and +200°F. (Cincinnati Sub Zero Products)

For more data circle No. 52 on postcard, p. 93

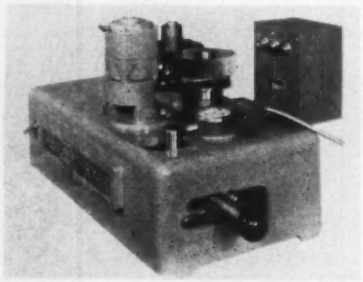
Power Cutter

Easily adapted to special operations, a cutting and forming machine accomplishes circular, straight and free-hand cutting and louvre. It cuts segments, rings and all shapes requiring specific arcs. It also cuts curved or corrugated sheets with no deformation at all. (Hedstrom Tool Co.)

For more data circle No. 53 on postcard, p. 93

Inspects Gears

For spur and helical gears, a motorized gear rolling fixture performs precision production inspection operations. The fixture features an electric indicator and signal light arrangement. A red light signals a gear that is above specified center distance. A green light indicates a gear that is within center distance inspection limits. The fixture basically consists of an 18- x 10-in.



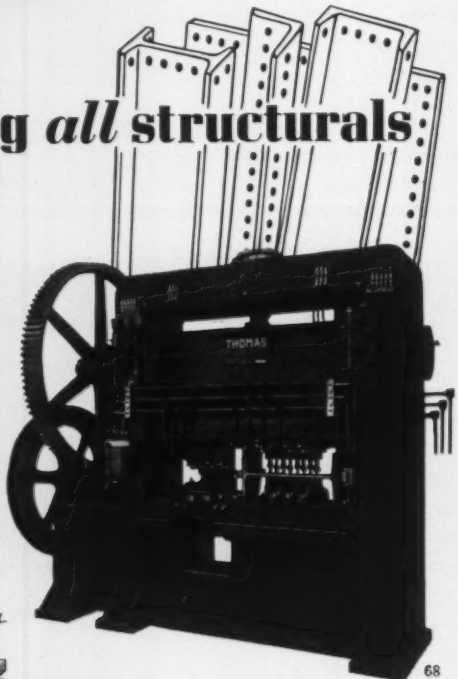
cast iron base, a T-slot for mounting a work gear shaft detail and a motor. (National Broach & Machine Co.)

For more data circle No. 54 on postcard, p. 93

Ventilating System

An industrial ventilator employs an unusual engineering principle. It combines both the recirculation of heated air in winter, and exhaust of hot air in summer into a single compact unit. The dual-purpose in-

for punching *all* structurals *and* plates



These Thomas All-Steel Multiple Punches will handle beams, angles, channels *and* wide plates. Offered in 150-, 225- and 300-ton sizes, they will accommodate beams from 3" to 36" WF and plates up to 72" with minimum changing of tools.

The trend is to Thomas

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PITTSBURGH 23, PA.

Write for detailed information on the size to meet your needs, either with or without a Thomas Spacing Table.

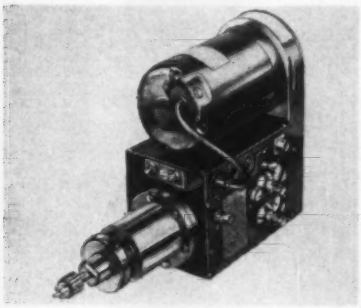
68

PUNCHES • SHEARS • PRESSES • BENDERS • SPACING TABLES

dustrial ventilator is easy to install and simple to operate. The ventilator ranges in size from 3000-23,000 cu ft per minute. (Genie-Air Products)

For more data circle No. 55 on postcard, p. 93

Drill Units



High-speed automatic drill units offer spindle speeds from 800-1500 rpm. They are for production of small holes from about 0.020-¼ in. in diam. High speed drilling offers: better hole finish; prolonged life of carbide tools and cleaner, burr-free holes. The units are also applicable to operations such as spinning of small rivets and friction welding. The drill units are complete with electric motor, traversing spindle and built-in controls. (The Dumore Co.)

For more data circle No. 56 on postcard, p. 93

Air Impact Wrench

In an air impact wrench, an improved air motor and housing is coupled with an impact mechanism. Air entry is through a ½-in. outlet. Streamlined housing insures free air flow with minimum restriction. With more air moving at higher speeds, the wrench accelerates rapidly for faster rundown. (Albertson & Co., Inc.)

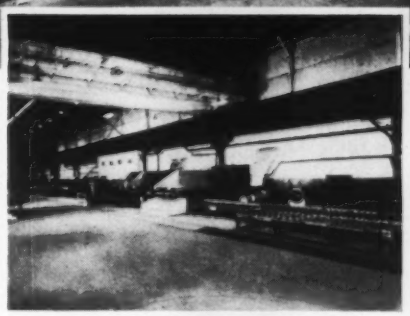
For more data circle No. 57 on postcard, p. 93

Combustion Indicator

An instrument accurately indicates changes in flame characteristics. These changes are caused by variations in gas fuel supply and air/gas mixture. The device detects and indicates changes as little as 5 Btu in fuel gas and ±0.5 pct air in air/gas mixture, in 5 seconds. (Selas Corp. of America)

For more data circle No. 58 on postcard, p. 93

"YOUNGSTOWN"
81" SHEET SCRUBBER LINE



Entry end of "Youngstown" 81" sheet scrubber line at United States Steel's Irvin Works.

. . . built for
United States Steel's Irvin Works
Dravosburg, Pa.

This ultra modern 500 fpm scrubber line is designed to increase tonnage per turn, in cleaning steel sheets up to 76" wide and .250" thick.

The line was furnished complete including unloading conveyor, skew conveyor, acid spray unit, water spray unit, alkali spray unit, hydro scrubber unit, sheet dryer, cooling system and conveyors, and all auxiliary equipment including acid proportioning, dry met, fume exhaust system, electric motors and controls, air conditioned electrical control station, installation, erection, and foundation engineering.

You can rely on "Youngstown's" 75 years of scrubbing, pickling and cleaning know-how. Your inquiries are invited whether you require a complete turnkey installation or any auxiliary component.

The Youngstown Foundry & Machine Co.

Youngstown 1, Ohio

30

Important facts to know about laminated plastics

A few Taylor composite laminates (left to right): copper-clad section; sandwiched copper component; Taylorite vulcanized fibre-clad part; laminated tube, copper inserts.

Composite Laminates Open Up New Design Opportunities

While the great variety of commercially available laminated plastics satisfy most electrical and mechanical requirements, there are applications that can benefit from the combination of properties provided by composite laminates. Recent advances in bonding techniques have made it possible to bond virtually any compatible material with a laminate. These can be supplied as clad or as sandwiched materials. And they can be molded into many shapes to fit design requirements. Taylor is presently supplying to order the following composite laminates:

- **Copper and laminated plastics.** Clad for printed circuits and formed shapes. Sandwiched for special applications.
- **Taylorite® vulcanized fibre-clad laminates.** These combine the high strength of laminated plastics with the superior hot-arc-resistance of vulcanized fibre. They are being used in both high and low-voltage switchgear applications. Also in applications where the high impact strength of vulcanized fibre may be advantageous.
- **Rubber-clad laminates.** Almost any type of natural or synthetic rubber may be used as the cladding material. These laminates are widely used for condenser tops in wet condensers to protect the laminate against highly alkaline electrolytes. They also have application in any part where sealing or chemical resistance is needed.
- **Asbestos-clad laminates.** For applications where high heat- and arc-resistance are required.
- **Laminate-clad lead.** Lead sheets sandwiched between Grade XX paper-base laminates have been used for X-ray shields. The laminate provides strength and contributes to the high shielding properties of the lead.
- **Aluminum-clad laminates.** These have been used extensively for engraving stock. They also offer possibilities as printed-circuit material and as plate holders for X-ray machines.
- **Beryllium copper-clad laminates.** Beryllium copper is nonmagnetic and a good conductor—properties that give these laminates possibilities in many applications.
- **Stainless steel-clad laminates.** Applications where nonmagnetic properties are required. Also in certain corrosive environments where the resistance of stainless steel to attack is an asset.
- **Magnesium-clad laminates.** These laminates have been produced in 108-in.-long sheets for use as screens for X-ray operators. Weight was a factor.

Our design and production engineers are constantly developing new materials, new applications, and new procedures for fabricating laminated plastics. Our experience is yours for the asking. And if you have a problem requiring assistance or more information on composite laminates, write us. Also ask for your copy of Taylor's new guide to simplified selection of laminated plastics. Taylor Fibre Co., Norristown 52, Pa.

Taylor

LAMINATED PLASTICS VULCANIZED FIBRE

NEW BOOKS

"The Million Dollar Bend," by Charles Eisler, is an absorbing account of the author's 50 years in American Industry. Interwoven in the book is a lively account of the personal and business hurdles he had to jump during his career. The book discusses Dr. Eisler's long list of inventions. They contributed greatly to the progress of the radio and lamp industry. The book also includes vivid descriptions of the author's patent fights of the 1920's in behalf of the smaller manufacturers. $4.75 per copy. William-Frederick Press, 391 E. 149 St., New York.

"Induction Heating: Coil and System Design," by P. G. Simpson, outlines practical methods for designing, building and testing induction heating equipment which meets current standards of quality. Contained in the book is an analysis of the engineering procedures covering the major areas of coils, power systems and generating equipment. The specifications given in the book stress economy as well as technical conditions which must be met. In addition, there is information on such special topics as high-power low-frequency coils, heat flow in induction heated billets and design of different matching output circuits. 308 pp. $11.50 each. McGraw-Hill, 327 W. 41st St., New York 36.

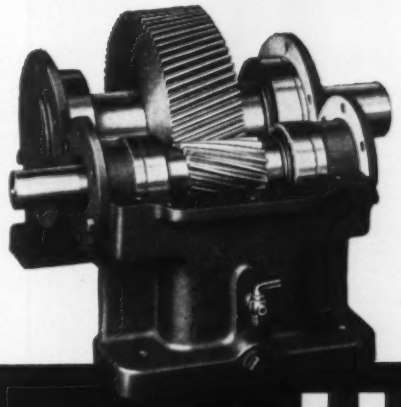
"Elevated Temperature Properties of Aluminum and Magnesium Alloys — STP 291" summarizes elevated temperature, tensile and creep rupture properties of current commercially established aluminum and magnesium alloys. These alloys are those normally used at elevated temperatures. Also covered are the alloys used in the aircraft industry for elevated temperature applications. Both wrought and cast alloys are covered in various forms. Title sheets for each alloy give the alloy designation, chemical composition and the pertinent specifications under which various forms of the material are supplied. 308 pp. $7.00

each. ASTM Headquarters, 1916 Race St., Phila. 3.

"For the Years to Come," by John F. Thompson and Norman Beasley, shows a primary Canadian industry in its international setting. The book emphasizes the principles of management that have evolved over the years of the growth of International Nickel of Canada. The book recounts many of the events which brought a great company into being and led to its present international position. 374 pp. $5.00 per copy. G. P. Putnam's Sons, 210 Madison Ave., New York 16.

"Successful Managerial Control by Ratio-Analysis," by Spencer A. Tucker, describes how to develop and apply the concept and techniques of ratio-analysis. It relates this for a wide variety of business situations and industries. This provides more effective management control. The system of control reduces company data and statistics to significant mathematical ratios. It interrelates their movements to provide managers with the necessary tools for evaluation, decision making and long-range planning. The book goes on to describe how a manager can cope with many facts, events and changes constantly generated normally in all areas of business activity. 436 pp. $11.00. McGraw-Hill, 327 W. 41st St., New York 36.

"Thermoelectricity" includes the proceedings of the conference on thermoeelectricity. Also contained in the book are additional papers that contain reviews and concepts originating during the last two years. Thirty-three authorities present their material under four major headings. They are: Fundamental Concepts in Thermoelectricity; Basic Parameters in Thermoelectricity; Chemical and Physical Properties of Materials at High Temperatures; Measurement of Material Properties. 407 pp. $10.00. John Wiley & Sons, Inc., 440 Park Ave. South, New York 16.



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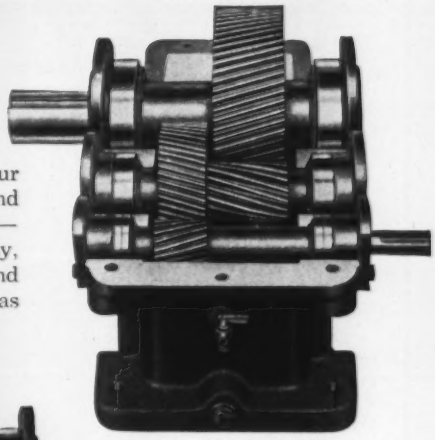

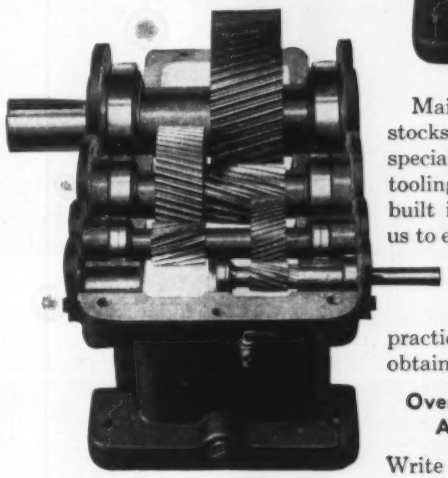

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New Auto Cutbacks Hurt Market

The market is caught between a moderate improvement in general orders and new cutbacks from Detroit.

Early-year optimism is tempered by the recent dominance in the market of automotive tonnage. But there are also positive signs.

■ A gain in new orders from general steel users is counter-balancing new automotive cutbacks.

But the latest series of setbacks from Detroit may wipe out much of the expected recovery in January. They also threaten the February-March outlook.

Balance Changes—The result of the general improvement weighed against the automotive cuts is a shifting in balance of the steel market. Automotive buying throughout 1960 made sheets the dominant product. As a result, mills with heavy automotive buyers were not as hard-hit by the overall drop in steel buying.

Now, mills with a broad range of customers will find themselves in a better position compared with late 1960. The automotive outlook, which is not yet resolved, will affect the heavy automotive suppliers.

Automotive Dominates — Shipments of steel by product underscore the dominant role automotive played in the steel market in 1960.

Shipments of hot-rolled, cold-rolled and galvanized sheets hit 24 million tons in the first 11 months of 1960. This was greater than for any full year since 1956. The 12-month totals will show that 1960 was the second biggest year for those products of any in history. The best was 1955 when nearly all steel records were set.

Percentage figures tell an even more striking story. Hot-rolled, cold-rolled, and galvanized sheets accounted for 35.8 pct of steel shipments in the first 11 months of 1960. This was the highest percentage for any year in recent history.

Optimism Tempered—This dominant position of the automotive market, compounded by the new cutbacks, accounts for the tempering of early-year enthusiasm. But there are some good signs, too.

Tinplate is picking up seasonally. Oil country seamless tubing has made decisive gains. Warehouses, particularly in the Midwest, are showing signs of better business. Some of the larger service centers report as much as 15 pct pickups this month over December.

The relatively depressed state of the oil country goods markets in 1960 is reflected in some current operating figures. One seamless tubing mill is now operating at 50 pct of capacity. This figure sounds low, but in the depths of 1960 oil country orders, it was operating at only 10 to 15 pct of capacity.

Not Decisive — Another factor that gives hope is that the automotive cutbacks may not be decisive. Any pickup in automotive sales would result in immediate reinstatement of set-back orders. However, a major re-scheduling of automotive tonnage is at best a hope, not an expectation.

Another hopeful indication is continued ordering by general steel users, even if not in large tonnages. Although some consumers are still trying to trim inventories, general steel users are now ordering to meet their production schedules.

District Steel Production Indexes
1957-59=100

	Last Week	Two Weeks Ago	Month Ago	Year Ago
North East Coast	83	70	73	145
Buffalo	68	59	62	151
Pittsburgh	70	62	71	145
Youngstown	73	58	64	162
Cleveland	77	77	74	162
Detroit	99	99	91	161
Chicago	86	85	79	143
Cincinnati	76	76	79	146
St. Louis	78	63	79	126
Southern	80	77	70	138
Western	90	85	85	129
U. S. Index	79.6	73.1	74.5	146.4

Source: American Iron and Steel Institute

Steel Production, Composite Prices

Production	Last Week	Two Weeks Ago	To Date 1961	To Date 1960
(Net tons, 000 Omitted)	1,482	1,361	2,843	5,442
Ingot Index				
(1957-59=100)	79.6	73.1	76.3	146.1
Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel, base (cents per lb)	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.44	$66.44	$66.32	$66.41
Scrap No. 1 hvy (Gross ton)	$31.50	$31.17	$28.50	$41.83
No. 2 bundles	$22.17	$21.50	$18.50	$28.17

Distributors Face Competition

Distributors are finding that competition from manufacturers is becoming greater.

James G. Pepper, vice president of purchasing, Sanson & Rowland, Inc., says the distributing trend is toward specialization.

■ Distributors in the metalworking area are facing increased competition from manufacturers. And the competition will become stiffer.

This is the opinion of James G. Pepper, vice president of purchasing, Sanson & Rowland, Inc., Philadelphia. The company is a distributing agent for the fastener industry.

Mr. Pepper told The IRON AGE that the biggest problem distributors face is this competition from manufacturers. He says this is because there are more manufacturers than there are "good" distributors.

"A sales manager at the manufacturing level surveys a given geographic area and sets a high sales quota. This, of course, has to be met by the salesmen. To do this, they must often by-pass the distributor and go out on their own."

Less Profit—Mr. Pepper says such moves often mean less profit for the manufacturer or original supplier. When the producer deals with a distributor, according to Mr. Pepper, he reduces his paperwork, inventory control, and shipping costs.

"This reduction in cost is usually far greater than the price reduction afforded the distributing agency."

This purchasing agent adds: "It's also beneficial to the ultimate consumer to deal through a distributor. At least there are extended benefits for the small business because this method means he should have none of the headaches and the expenses of a complex purchasing department.

"A good distributor can offer the consumer competitive prices and service."

Specialization Trend—He points out that there is a definite trend among distributors now to become specialized. "In the past," he notes, "most outfits used to be general mill and factory supply houses.

"However, you have to be a specialist in some area to survive now."

Mr. Pepper claims the consumer wants to feel he can turn to the distributor for a particular need and know that the outfit is "qualified" to locate the item faster than a "general" supplier.

Even though competition from producers is becoming greater, the distributing field is growing. More and more metalworking distributors are coming into existence. "This," says Mr. Pepper, "is because there is a market for this type service."

JAMES G. PEPPER: "Distributors can mean more profits."

3M Abrasives Cut Costs of Steel Utensil Finishing

Nationally famous, "Ekcoware" cooking utensils are manufactured here in the housewares division of Ekco Products, Inc., Massillon, Ohio. Prior to color buffing, these copper-clad stainless steel pans are given a final polishing.

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More Mills Announce Thin Tinplate

In the past week or so, several tinplate producers announced production of thin tinplate.

Others have said they expect to offer similar products before very long.

■ More steel companies are beginning to move into production of thin tinplate, and others have announced intentions to be in production before long.

United States Steel Corp. started selling thin tinplate last fall. It was followed by Bethlehem Steel Corp. But a number of tinplate producers announced in the past week they are ready—or nearly ready—to offer thin tinplate in commercial quantities.

First Shipment—Jones & Laughlin Steel Corp. says it has shipped its first production quantities of a new "double reduced" tinplate. This light tinplate is made by cold-rolling after the tin coating has been applied.

Weirton Steel Co., Div. of National Steel Corp., says it started commercial shipments of a double reduced tinplate within the past 30 days.

National also reports provisions are being made for the manufacture of a thin tinplate later this year by Midwest Steel Co., a new rolling division at Portage, Ind., near Chicago. Midwest made its first shipment of commercial galvanized steel sheets last week.

Other New Producers—Wheeling Steel Corp. plans to introduce a similar product in March or April (IA—Jan. 12, '61, p. 90). Youngstown Sheet & Tube Co. reports it has made several trial lots of thin tinplate for experimental purposes. The company says it is now ready to accept quantity production orders

Earlier, Granite City Steel Co. had announced that it will begin rolling lightweight tinplate in the spring. It didn't set a definite introduction date, however.

Price Schedules—J&L will offer the lightweight tinplate in base weights of 55 lb and 60 lb, the same as Wheeling announced it would do. J&L didn't quote prices, but said it would "be competitive." Wheeling said its prices are $6.40 a base box for 55 lb metal and $6.55 a base box for the 60 lb metal.

U.S. Steel and Bethlehem offer, also, a 45 lb and a 50 lb thin tinplate at $6.10 and $6.25.

Sheet and Strip—Reshuffling of automotive schedules is causing more than its share of headaches for steel producers. Sales offices in **Detroit** are exceptionally gloomy. One says its cancellations for January, so far, exceed tonnage booked.

PURCHASING AGENT'S CHECKLIST

Industry and military leaders debate defense buying policies, reliability stressed. P. 48

Are better days coming in the steel scrap market? P. 53

Mechanized handling automates big structural assemblies. P. 75

Auto-related orders are tapering off on the East Coast. Sharp cutbacks in sheet orders have been scheduled for February by at least one **Pittsburgh** auto plant. Advance bookings are lower than they were a month ago in **Chicago.** Smaller companies are starting to beef up inventories in **Cleveland,** helping to offset automotive setbacks and concellations.

Bars—January is shaping up a little better than December for hot-rolled bars in **Pittsburgh.** However, there is no decisive change from levels of the past six months. Some gains are reported from **Chicago.** Farm equipment and earth moving equipment production in the **Midwest** is helping to ease the impact of automotive cutbacks.

Pipe and Tubing—Some oil country seamless orders are beginning to develop that are in line with consumption. A seamless mill in the **Pittsburgh** district is now up to 50 pct of capacity; at the 1960 low point, in July, the same mill was down to 15 to 20 pct of capacity. Standard sizes of oil country products are being sold steadily in small quantities from field stocks, according to **Cleveland** reports. Users have little inventory and need fast delivery.

Wire—The outlook is a little better for wire products than it has been in the past month or so. **Cleveland** producers expect to return to 50 pct capacity this month after falling to 40 pct in December. A New York importer is looking for suppliers of farm wire grades in the **Midwest.** He's having trouble getting delivery from Europe.

Electricweld Pipe—Kaiser Steel Corp. has reduced prices of electricweld steel pipe about $20 a ton for pipe ranging from 5 9/16 in. to 18 in. in diameter. Kaiser officials say the move is "to meet price competition of other pipe producers in the West and Midwest.

U.S. Steel Co., whose Columbia-Geneva Div. makes and sells pipe in West Coast markets, is "studying" the Kaiser price move.

COMPARISON OF PRICES

(Effective January 16, 1961)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Jan. 16 1961	Jan. 9 1961	Dec. 13 1960	Jan. 19 1960
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished oar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Jan. 16 1961	Jan. 9 1961	Dec. 13 1960	Jan. 19 1960
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.68	$70.68	$70.11	$70.57
Foundry, South Cin'ti	71.92	71.92	71.92	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.11	70.11	69.61	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb.‡	11.00	11.00	11.00	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.44	$66.44	$66.32	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$29.50	$29.50	$26.50	$43.50
No. 1 steel, Phila. area	35.50*	34.50	33.50	41.50
No. 1 steel, Chicago	29.50	29.50	25.50	40.50
No. 1 bundles, Detroit	26.50	26.50	21.50	39.50
Low phos., Youngstown	34.50	34.50	28.50	48.50
No. 1 mach'y cast, Pittsburgh	44.50	44.50	44.50	55.50
No. 1 mach'y cast, Phila.	48.50*	47.50	47.50	54.50
No. 1 mach'y cast, Chicago	44.50	44.50	41.50	60.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$31.50*	$31.17	$28.50	$41.83
No. 2 bundles	22.17*	21.50	18.50	28.17
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.75-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	30.00	30.00	30.00	33.00
Copper, Lake, Conn.	30.00	30.00	30.00	33.00
Tin, Straits, N. Y.	100.375†	100.50	101.875	100.00
Zinc, East St. Louis	11.50	....	13.00	13.00
Lead, St. Louis	11.00	11.00	11.80	11.80
Aluminum, ingot	26.00	26.00	26.00	28.10
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

INDEX TO PRICE PAGES

Prices At a Glance 111
Comparison of Prices 115
Bars 122
Billets, Blooms and Slabs 120
Boiler Tubes*
Clad Steel*
Coke 125
Electrical Sheets*
Electrodes*
Electroplating Supplies*
Fasteners 124
Ferroalloys 126
Iron Ore 124
Merchant Wire Products 124
Metal Powders*
Nonferrous
  Mill Products 119
  Primary Prices 115-118-119
  Remelted Metals 119
  Scrap 119
Piling 120
Pig Iron 124
Pipe and Tubing 125
Plates 122
Rails*
Refractories*
Service Center Prices 123
Shapes 120
Sheets 121
Spring Steel 124
Stainless 124
Steel Scrap 117
Strip 120
Structurals 120
Tinplate 121
Tool Steel 124
Track Supplies*
Water Pipe Index 125
Wire 122
Wire Rod 121

*Appears in the Jan. 12-Jan. 26 issues.

Edging hot strip steel

No place for second-best equipment. That's why this heavy-duty vertical overdrive edger uses rugged Cone-Drive **double-enveloping worm** gearing to drive the vertical rolls continuously.

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New Domestic Interest Reported

For the first time in several months, scrapmen are reporting fair domestic activity.

Export demand remains strong and prices generally are up again.

■ The scrap market again shows price gains in most areas. Domestic activity, almost dormant at some coastal operations in recent months, is beginning to come to life. Exports continue strong.

The Cleveland market, which led last week's price gains, ran out of steam this week as brokers found no trouble covering themselves on old orders.

Strong prices on railroad lists were reported from Pittsburgh and St. Louis. In Pittsburgh, the lists mirrored tight supply and strong export demand.

Bad weather at East Coast port areas may again bring a temporary demand for certain export items and premium prices for those dealers able to get scrap to the ports.

The IRON AGE composite price for No. 1 heavy melting is up to $31.50 this week on the basis of increased prices in Philadelphia. The composite price for No. 2 heavy melting is up to $22.17. This is the highest these prices have been since September, 1960.

Pittsburgh — Tight supply and strong export demand were again reflected in railroad lists. Railroad specialties moved up $3 to $4 this month and unprepared railroad grades were up as much as $10. In the case of specialties, list prices were backed by sales to local consumers. Some of the better dealer grades have moved up with the industrial market. However, the thinness of the dealer market was shown last week when yards were being quoted less for No. 2 heavy melting than for No. 2 bundles.

Chicago — The market held strongly at previous levels despite at least one mill offering of lower prices for factory bundles and No. 1 railroad scrap. Stainless slipped slightly on a small sale to a local producer, but material continues to move out of the area at strong price levels. Strengthening factors: Higher railroad list prices and higher offerings for No. 1 heavy melting.

Philadelphia — Scrapmen in the area are cautiously optimistic. There has been a slight increase in domestic activity and export demand is still strong. Bad weather may again affect slight price increases, but this would only be a temporary development in some grades. Purchases of No. 1 heavy melting brought the price up $1 this week.

New York—The market is firm, but based wholly on export. It isn't firm enough to affect prices. There seems to be some pickup in stainless. But these items have been in the doldrums so long that dealers are cautious. Present inquiries for stainless are at lower prices.

Detroit—The market is quiet and steady. Opinion differs greatly on what the next move will be. Some say they can't see further weaknesses and expect a month-end show of force. Others predict a softness, particularly in No. 2 grades, on the February industrial list. Export interest remains a bullish factor.

Cleveland—The market has lost its steam temporarily as brokers easily covered themselves on old orders. Mills are still not interested in big tonnages since most still have good stockpiles.

Cincinnati—The market is firm but quiet on steel grades. But foundries are starting to come to life. Many apparently waited for the start of a new year. Foundry prices are also up. Dealers generally are holding out for higher prices and will now sell only small quantities.

St. Louis—Railroad items continue their upward move in the area. However, the general climb in other grades that has been expected has not yet materialized. The flow of scrap remains slow. Dealer resistance is being met now by mill resistance.

Birmingham—The scrap market is active and fairly strong. Export and northern buying have narrowed the territory from which Birmingham draws, further limiting available scrap.

Buffalo—Mills are buying absolutely nothing. And there is no real change exected soon. The market is dull; prices unchanged.

Boston—For the first time in many months, the domestic market began to come alive this week. Export is still good and dealers say the situation now looks interesting.

West Coast—Active exports are giving the market a much firmer tone. All three ports—Los Angeles, San Francisco and Seattle — are busy. Some exporters are reportedly paying above the quoted prices to fill out the cargoes.

Houston—A pickup in foundry consumption brought a $1 increase in the plate and structural price. Export activity remains good. The domestic mill continues to buy selected items from broker-dealer yards.

SCRAP PRICES *(Effective January 16, 1961)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	30.00 to 31.00
No. 1 factory bundles	36.00 to 37.00
No. 2 bundles	23.00 to 24.00
No. 1 busheling	29.00 to 30.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	17.00 to 18.00
Low phos. punch'gs plate	36.00 to 37.00
Heavy turnings	25.00 to 26.00
No. 1 RR hvy. melting	35.00 to 36.00
Scrap rails, random lgth.	43.00 to 44.00
Rails, 2 ft. and under	47.00 to 48.00
RR specialties	42.00 to 43.00
No. 1 machinery cast.	44.00 to 45.00
Cupola cast.	35.00 to 36.00
Heavy breakable cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	175.00 to 180.00
18-8 turnings	95.00 to 100.00
430 bundles and solids	85.00 to 90.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	30.00 to 31.00
No. 1 factory bundles	35.00 to 36.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	29.00 to 30.00
Machine shop turn.	14.00 to 15.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Low phos. forge crops	38.00 to 39.00
Low phos. punch'gs plate, ¼ in. and heavier	36.00 to 37.00
Low phos. 2 ft. and under	34.00 to 35.00
No. 1 RR hvy. melting	33.00 to 34.00
Scrap rails, random lgth.	41.00 to 42.00
Rerolling rails	53.00 to 55.00
Rails 2 ft. and under	46.00 to 47.00
Angles and splice bars	41.00 to 42.00
RR steel car axles	54.00 to 55.00
RR couplers and knuckles	38.00 to 39.00
No. 1 machinery cast.	44.00 to 45.00
Cupola cast.	39.00 to 40.00
Cast iron wheel	30.00 to 31.00
Malleable	43.00 to 44.00
Stove plate	34.00 to 35.00
Steel car wheels	38.00 to 39.00
Stainless	
18-8 bundles and solids	170.00 to 175.00
18-8 turnings	95.00 to 100.00
430 bundles and solids	90.00 to 95.00
430 turnings	55.00 to 60.00

Philadelphia Area

No. 1 hvy. melting	$35.00 to $36.00
No. 2 hvy. melting	31.00 to 32.00
No. 1 dealer bundles	37.00 to 38.00
No. 2 bundles	22.00 to 23.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	12.00 to 13.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	18.00 to 19.00
Clean cast, chem. borings	23.00 to 24.00
Low phos. 5 ft and under	38.00 to 39.00
Low phos. 2 ft punch'gs	40.00 to 41.00
Elec. furnace bundles	37.00 to 38.00
Heavy turnings	25.00 to 26.00
RR specialties	39.00 to 40.00
Rails, 18 in. and under	49.00 to 50.00
Cupola cast.	37.00 to 38.00
Heavy breakable cast.	38.00 to 39.00
Cast iron car wheels	39.00 to 40.00
Malleable	45.00 to 46.00
No. 1 machinery cast.	48.00 to 49.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$24.50 to $25.50
No. 2 hvy. melting	22.50 to 23.50
No. 1 dealer bundles	25.50 to 26.50
No. 2 bundles	17.00 to 18.00
Machine shop turn.	9.00 to 10.00
Shoveling turnings	11.00 to 12.00
Cast iron borings	11.00 to 12.00
Low phos. 18 in. and under	35.00 to 36.00
Rails, random length	38.00 to 39.00
Rails, 18 in. and under	44.00 to 45.00
No. 1 cupola cast.	35.00 to 36.00
Heavy breakable cast.	28.00 to 29.00
Drop broken cast.	45.00 to 46.00

Youngstown

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	21.00 to 22.00
No. 1 dealer bundles	32.00 to 33.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	16.00 to 17.00
Low phos. plate	34.00 to 35.00

Cleveland

No. 1 hvy. melting	$29.50 to $30.50
No. 2 hvy. melting	17.00 to 18.00
No. 1 dealer bundles	29.50 to 30.50
No. 1 factory bundles	32.50 to 33.50
No. 2 bundles	19.00 to 20.00
No. 1 busheling	29.50 to 30.50
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Cut structural & plates, 2 ft & under	35.00 to 36.00
Low phos. punch'gs plate	29.50 to 30.50
Drop forge flashings	29.50 to 30.50
Foundry steel, 2 ft. & under	31.00 to 32.00
No. 1 RR hvy. melting	32.00 to 33.00
Rails 2 ft. and under	45.00 to 46.00
Rails 18 in. and under	46.00 to 47.00
Steel axle turnings	23.00 to 24.00
Railroad cast.	45.00 to 46.00
No. 1 machinery cast.	45.00 to 46.00
Stove plate	39.00 to 40.00
Malleable	44.00 to 45.00
Stainless	
18-8 bundles	160.00 to 165.00
18-8 turnings	80.00 to 90.00
430 bundles	75.00 to 80.00

Buffalo

No. 1 hvy. melting	$23.00 to $24.00
No. 2 hvy. melting	20.00 to 21.00
No. 1 busheling	23.00 to 24.00
No. 1 dealer bundles	23.00 to 24.00
No. 2 bundles	17.00 to 18.00
Machine shop turn.	9.00 to 10.00
Mixed bor. and turn.	10.00 to 11.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	11.00 to 12.00
Low phos. plate	31.00 to 32.00
Structurals and plate, 2 ft. and under	33.00 to 34.00
Scrap rails, random lgth.	32.00 to 33.00
Rails 2 ft. and under	42.00 to 43.00
No. 1 machinery cast.	42.00 to 43.00
No. 1 cupola cast.	36.00 to 37.00

St. Louis

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	25.00 to 26.00
Foundry steel, 2 ft.	28.00 to 29.00
No. 1 dealer bundles	28.00 to 29.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	7.00 to 8.00
Shoveling turnings	9.00 to 10.00
Cast iron borings	16.00 to 17.00
No. 1 RR hvy. melting	32.00 to 33.00
Rails, random lengths	37.00 to 38.00
Rails, 18 in. and under	39.00 to 40.00
RR specialties	38.00 to 39.00
Cupola cast.	38.00 to 39.00
Heavy breakable cast.	31.00 to 32.00
Stove plate	34.00 to 35.00
Cast iron car wheels	33.00 to 34.00
Rerolling rails	49.00 to 50.00
Unstripped motor blocks	33.00 to 34.00

Birmingham

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	34.00 to 35.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	9.00 to 10.00
Electric furnace bundles	34.00 to 35.00
Elec. furnace, 3 ft. & under	34.00 to 35.00
Bar crops and plate	38.00 to 39.00
Structural and plate, 2 ft.	37.00 to 38.00
No. 1 RR hvy. melting	32.00 to 33.00
Scrap rail, random lgth.	40.00 to 41.00
Rails, 18 in. and under	45.00 to 46.00
Angles and splice bars	36.00 to 37.00
No. 1 cupola cast.	45.00 to 46.00
Stove plate	45.00 to 46.00
Cast iron car wheels	35.00 to 36.00
Unstripped motor blocks	32.00 to 33.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	20.00 to 21.00
No. 2 dealer bundles	15.00 to 16.00
Machine shop turnings	2.00 to 3.00
Mixed bor. and turn.	3.00 to 4.00
Shoveling turnings	5.00 to 6.00
Clean cast. chem. borings	17.00 to 18.00
No. 1 machinery cast.	36.00 to 37.00
Mixed yard cast.	32.00 to 33.00
Heavy breakable cast.	30.00 to 31.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	70.00 to 75.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$22.00 to $23.00
No. 2 hvy. melting	19.00 to 20.00
No. 1 dealer bundles	26.00 to 27.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	22.00 to 23.00
Drop forge flashings	22.00 to 23.00
Machine shop turn.	7.00 to 8.00
Mixed bor. and turn.	11.00 to 12.00
Shoveling turnings	11.00 to 12.00
Cast iron borings	11.00 to 12.00
Heavy breakable cast.	25.00 to 26.00
Mixed cupola cast.	30.00 to 31.00
Automotive cast.	35.00 to 36.00
Stainless	
18-8 bundles and solids	145.00 to 150.00
18-8 turnings	45.00 to 50.00
430 bundles and solids	50.00 to 55.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$23.50 to $24.50
No. 2 hvy. melting	19.00 to 20.00
No. 1 dealer bundles	23.00 to 24.00
No. 2 bundles	12.00 to 13.00
No. 1 busheling	24.00 to 25.00
Machine shop turn.	3.50 to 4.50
Shoveling turnings	5.50 to 6.00
Clean cast. chem. borings	11.00 to 12.00
No. 1 machinery cast.	37.00 to 38.00
Mixed cupola cast.	29.00 to 30.00
Heavy breakable cast.	26.50 to 27.50

San Francisco

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 1 dealer bundles	$27.00 to 28.00
No. 2 bundles	18.00
Machine shop turn.	14.00
Cast iron borings	14.00
No. 1 cupola cast.	46.00 to 48.00

Los Angeles

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	24.00 to 25.00
No. 2 bundles	17.00
Machine shop turn.	12.00
Shoveling turnings	13.00
Cast iron borings	13.00
Elec. furnace 1 ft. and under (foundry)	42.00
No. 1 cupola cast.	39.00

Seattle

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	31.00
No. 2 bundles	21.00
No. 1 cupola cast.	36.00
Mixed yard cast.	31.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$24.00
No. 2 hvy melting cut 3 ft. and under	20.50
No. 1 dealer bundles	24.00
No. 2 bundles	17.00
Mixed steel scrap	16.00
Bush., new fact, prep'd	23.00
Bush., new fact, unprep'd	18.00
Machine shop turn.	8.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	30.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 2 bundles	20.50
Machine shop turn.	8.00
Shoveling turnings	11.00
Cut structural plate 2 ft. & under	$41.00 to 42.00
Unstripped motor blocks	26.00 to 27.00
Cupola cast.	33.00 to 34.00
Heavy breakable cast.	25.00 to 26.00

Zinc Discounting: Has It Ended?

For a while, the zinc market appeared to be stabilized as discounting came to a halt.

But the flurry left the market in a weak condition. If the market softens, discounting may recur.

▪ The discounting crisis in the domestic zinc market has passed. But it left the market in a weak condition.

The confusing discount system of pricing set by St. Joseph Lead Co. on the first business day of 1961 ended late last week. The new, firm price for zinc is 11½¢ per lb at E. St. Louis, and 12¢ delivered in New York.

Where's the End?—Under the St. Joseph system, customers would be billed the average price of zinc for the month, minus a ½¢ per lb discount. The rub was that all of the producers went along, so there was no firm price from which to strike an average.

St. Joseph established the firm price on Jan. 12. The company said the problem of discounting the list price had eased, so there was no reason to continue the complicated pricing technique.

The company said it had started its public discounting primarily to call attention to discounting it felt was undermining the stability of the domestic market.

The Stabilizer—American Smelting & Refining Co. was among the leaders in reestablishing a firm price.

No one had wanted to be the first to establish a price because this would be the base from which St. Joe, and others, would discount. But, Asarco set the 11½¢ price, and then quietly assured customers that whatever St. Joe billed, that is what Adarco customers would pay.

A spokesman at St. Joe said he felt the harmful discounting was about dead. But other major zinc sellers weren't quite sure. If the market gets too soft, it might pop up again.

Push and Pull

"I missed getting the promotion. They seemed to agree that I had a lot of push. But I lost out to some guy that had a lot more pull."

Nickel

A spokesman for the Freeport Nickel Co. says his company has made no decision yet on whether to deduct as a loss for 1960 tax purposes, the mine and concentrating plant seized by the Cuban government. He said that the company was giving the matter some top-priority thinking, and that a definite decision would be forthcoming soon.

This spokesman also indicated the Freeport is looking elsewhere for sources of ore and/or concentrates to keep its Louisiana smelter busy. A number of possibilities are being considered, but the company isn't near a decision on this problem yet, says the spokesman.

If Freeport writes off the Cuban confiscation, chances are the company will move to replace it somewhere else in the world. Probably, these sources would be temporary.

Meanwhile, the company has reassigned its key nickel personnel within the company.

It could reassemble them and get back into production within a short time if conditions change.

Tin prices for the week: Jan. 10—100.375; Jan. 11—100.25; Jan. 12—100.25; Jan. 13—100.375; Jan. 16—100.375*.

*Estimate.

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum Ingot	26.00	24.70	12/17/59
Copper (E)	30.00	33.00	10/11/60
Copper (CS)	29.00	30.00	1/11/61
Copper (L)	30.00	33.00	10/13/60
Lead, St. L.	10.80	11.80	12/13/60
Lead, N. Y.	11.00	12.00	12/13/60
Magnesium Ingot	36.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/6/56
Titanium sponge	150–160	162–182	8/1/59
Zinc, E. St. L.	11.50	12.50	1/12/61
Zinc, N. Y.	12.00	13.00	1/12/61

ALUMINUM: 99% Ingot **COPPER:** (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. **LEAD:** common grade. **MAGNESIUM:** 99.8% pig Velasco Tex. **NICKEL:** Port Colborne, Canada. **ZINC:** prime western. Other primary prices, pg. 119.

NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.038	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size"	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 1/2
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	55.13	.....	52.36	56.32
Brass, Yellow	49.27	49.56	49.21	53.43
Brass, Low	51.75	52.04	51.69	55.81
Brass, Red	52.62	52.91	52.56	56.68
Brass, Naval	54.08	60.39	47.89	58.24
Munts Metal	52.14	.....	47.45	.....
Comm. Bz.	54.03	54.32	53.97	57.84
Mang. Bz.	57.82	.....	51.42	.....
Phos. Bz. 5%	75.70	75.70	76.20	77.63

Free Cutting Brass Rod $4.88

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex. 29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $65.00
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $70.00
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.50
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base.... $ 1.31
Cobalt, 97-99% (per lb) ....$1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined ..... $29.95 to $36.95
Gold, U. S. Treas., per troy oz..... $35.00
Indium, 99.9% dollars per troy oz.. $ 2.25
Iridium, dollars per troy oz.....$75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb. 57.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $208 to $210
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz...$24 to $26
Platinum, dollars per troy oz...$82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.)..... 91.375
Thorium, per kg $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 28.38
- No. 120 ..... 27.25
- No. 123 ..... 26.25

80-10-10 ingot
- No. 305 ..... 32.75
- No. 315 ..... 30.50

88-10-2 ingot
- No. 210 ..... 40.50
- No. 215 ..... 37.25
- No. 245 ..... 32.50

Yellow ingot
- No. 405 ..... 23.50

Manganese bronze
- No. 421 ..... 27.50

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 24.25-24.50
- 0.60 copper max. 24.00-24.25

Piston alloys (No. 132 type)..26.00-27.00
No. 12 alum. (No. 2 grade)...22.75-23.25
108 alloy 23.25-23.75
195 alloy 25.75-26.75
13 alloy (0.60 copper max.)...24.00-24.25
AXS-679 (1 pct zinc) 23.00-24.00

Steel deoxidizing aluminum notch bar granulated or shot
- Grade 1—95-87½% 23.75-24.75
- Grade 2—92-95% 22.50-23.50
- Grade 3—90-92% 21.50-22.50
- Grade 4—85-90% 21.00-22.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	26	25¼
Yellow brass	20⅝	18⅝
Red brass	23¼	22½
Comm. bronze	24	23¼
Mang. bronze	19½	18⅝
Free cutting rod ends.	19⅝	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

- No. 1 copper wire 24
- No. 2 copper wire 22½
- Light copper 20¼
- *Refining brass 20¾
- Copper bearing material 20

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

- No. 1 copper wire 23¾
- No. 2 copper wire 22¼
- Light copper 20
- No. 1 composition 20
- No. 1 comp. turnings 19
- Hvy. yellow brass solids 15
- Brass pipe 14
- Radiators 16

Aluminum

- Mixed old cast. ..... 11½—12
- Mixed new clips ..... 13½—14
- Mixed turnings, dry ..... 12½—13

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

- No. 1 copper wire ..... 21 —21½
- No. 2 copper wire ..... 19 —19½
- Light copper ..... 17 —17½
- Auto radiators (unsweated) .. 12 —12½
- No. 1 composition ..... 16 —16½
- No. 1 composition turnings... 15 —15½
- Cocks and faucets ..... 12¾—13
- Clean heavy yellow brass ... 12 —12½
- Brass pipe ..... 13 —13½
- New soft brass clippings .... 13 —13½
- No. 1 brass rod turnings .... 12½—13

Aluminum

- Alum. pistons and struts .... 6½— 7
- Aluminum crankcase ..... 8½— 9
- 1100 (Ss) aluminum clippings 11½—12
- Old sheet and utensils ..... 8½— 9
- Borings and turnings ..... 4½— 5
- Industrial castings ..... 9 — 9½
- 2020 (24s) clippings ..... 10 —10¼

Zinc

- New zinc clippings ..... 6 — 6¼
- Old zinc ..... 3 — 3½
- Zinc routings ..... 3 — 3¼
- Old die cast scrap ..... 1¼— 1½

Nickel and Monel

- Pure nickel clippings 52-54
- Clean nickel turnings 40
- Nickel anodes 52-54
- Nickel rod ends 52-54
- New Monel clippings 23-23.50
- Clean Monel turnings 16.50-17
- Old sheet Monel 22-23
- Nickel silver clippings, mixed. 18
- Nickel silver turnings, mixed. 15

Lead

- Soft scrap lead ..... 7 — 7½
- Battery plates (dry) ..... 3 — 3¼
- Batteries, acid free ..... 2 — 2¼

Miscellaneous

- Block tin ..... 75 —77
- No. 1 pewter ..... 57.50—58
- Auto babbitt ..... 43 —44
- Mixed common babbitt ..... 10 —10½
- Solder joints ..... 13½—14
- Small foundry type ..... 9 — 9½
- Monotype ..... 9 — 9½
- Lino. and stereotype ..... 8 — 8¼
- Electrotype ..... 7½— 7¾
- Hand picked type shells ..... 5¼— 5¾
- Lino. and stereo. dross ..... 2 — 2½
- Electro dross ..... 2¼— 2¾

(Effective Jan. 16, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PIL-ING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1, T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh Midland Butler Aliquippa N. Castle McKeesport Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3, B4, M10* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, City, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

(Effective Jan. 16, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled 18 ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* 1.25 lb. base box	Electro** 0.25 lb. base box	Thin 0.25 lb. coating in coils
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb. 0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb. 0.25 lb. add 65¢.		Prices are for 50 lb. base box for 45 lb. deduct 15¢; for 55 lb. add 15¢; for 60 lb. add 30¢.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*				$9.20 *U1*	$6.35 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	6.25 *B3*
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*	Holloware Enameling 29 ga.—7.85 *U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; 7.95 *G2* at Granite City.		
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*	6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1, Y1*	$6.25 *U1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1*†† *R3*	7.525 *R3, S1*	9.275 *R3*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*		6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2, R3*	$10.50 *T2*	$9.20 *T2*	$6.35 *T2*
	Houston, Texas									6.65 *S2*			

* Electrogalvanized sheets.

(Effective Jan. 16, 1961)

†† 7.425 at Sharon; Niles is 7.225.

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *P2*		7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.		5.675 *B3*									
	Fairless, Pa.	5.825 *U1*	5.825 *U1*									
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875 *L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,13*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8B5H2* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*				7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R5,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*		7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.25 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Jan. 16, 1961) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
B9 Barry Universal Corp., Detroit, Mich.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit
H2 Hercules Drawn Steel Corp., Toledo, O.

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery; Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structure ‡	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	.....	.....	.....	.....
Baltimore**	$.10	7.87	9.71	10.16	10.28	8.44	9.13	8.65	11.80	17.48	16.48	21.58	20.83
Birmingham**		8.46	10.20	10.69	9.45	8.41	8.47	8.26	13.14	16.76	16.76	.....	.....
Boston**	.10	9.84	10.68	11.87	12.26	9.72	10.26	9.87	13.45	17.79	16.79	23.89	21.14
Buffalo**	.15	8.80	9.95	11.40	11.15	8.80	9.30	8.90	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	9.37	10.35	10.85	11.54	9.21	9.72	9.37	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	8.89	10.41	10.35	11.21	8.94	9.62	9.02	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	8.72[1]	10.13	11.39	11.01	8.80	9.45	8.81	11.40	17.21	16.21	21.31	20.56
Denver**		10.90	12.53	13.27	13.07	10.74	11.24	10.88	12.97	.....	.....	.....	20.84
Detroit**	.15	9.63	10.61	11.20	11.91	9.58	10.29	9.68	11.16	17.38	16.38	21.48	20.73
Houston**		9.22	9.65	12.19[3]	10.78	8.95	8.86	8.63	13.10	17.50	16.55	21.55	20.85
Kansas City**	.15	9.59	11.42	10.95	11.76	9.43	9.93	9.57	11.77	17.17	15.87	21.87	21.12
Los Angeles**		9.50[1]	11.20	12.20	11.29	9.70	10.45	9.55	14.20	18.30	17.35	22.90	22.20
Memphis**	.15	9.13	10.50	.....	10.79	8.81	9.16	8.97	12.89	.....	.....	.....	.....
Milwaukee**	.15	9.51	10.49	10.99	11.68	9.35	9.94	9.51	11.04	17.24	16.24	21.24	20.59
New York	.10	9.46	10.23	11.45	11.56	9.61	10.30	9.84	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia**	.10	8.45	9.70	10.76	10.45	8.80	9.05	8.85	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	8.72	10.13	11.28	10.99	8.56	9.06	8.70	11.40	17.10	16.10	21.20	20.45
Portland**		9.45	11.30	12.35	11.45	9.60	10.05	9.45	16.65	18.60	17.80	22.70	22.20
San Francisco**	.10	10.27	11.79[2]	11.50	11.88	10.48	10.59	10.17	15.20	18.30	17.35	22.90	22.20
Seattle**		10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.20	18.60	17.80	22.70	22.20
Spokane**	.15	10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.35	17.75	17.95	21.58	22.35
St. Louis**	.15	9.57	10.75	11.23	11.74	9.43	9.95	9.59	11.43	17.48	16.48	21.58	20.83
St. Paul**	.15	8.99	9.84	10.99	11.16	8.83	9.33	8.97	11.64	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—¼" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—⅝-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Jan. 16, 1961)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Lyles, Tenn. *T3*	.....	.....	.....	.....	73.00
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
Sp. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	73.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, (Globe Dv.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container) — Pct

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container) — Pct

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Price on application assembled to bolts.)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	46	46
Machine Screws—bulk		
¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 lb
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

f.o.b. mills

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Jan. 16, 1961)

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50-32.75	32.00	29.50-34.50	47.50	38.00	46.50	—	19.25-21.50	—	19.75 21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25 31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R5;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge, Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G3;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails	Woven Wire Fence	"T" Fence Posts	Single Loop Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
	Col	Col	Col	Col	Col		
Alabama City *R3*	173	187	.....	212	193	9.00	9.55
Aliquippa *J3***	173	190	.....	.....	190	9.00	9.675
Atlanta *A8***	173	191	.....	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Chicago *W7*	173	.....	.....	.....	.....	9.00	9.55†
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dav. *M4***	175	193	.....	214	199	9.10	9.85
Donora, Pa. *A5*	173	187	.....	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	.....	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192	.....	217	198	9.25	9.80†
Jacksonville *M4*	184 1	197	.....	219	203	9.10	9.775
Johnstown *B3***	173	190	177	.....	196	9.00	9.675
Joliet, Ill. *A5*	173	187	.....	212	193	9.00	9.55
Kokomo *C9**	175	189	.....	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	.....	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	.....	.....	213	9.95	10.50
Rankin Pa. *A5*	173	187	.....	.....	193	9.00	9.55
So. Chicago *R3*	173	187	.....	.....	193	8.65	9.20
S. San Fran. *C6.*	.....	.....	.....	236	.....	9.95	10.50
SparrowsPt. *B3***	175	.....	.....	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

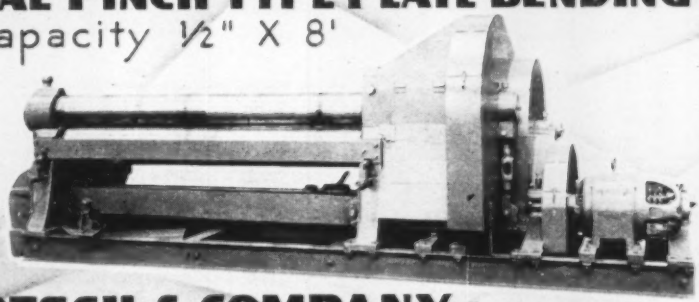
Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

	Net-Ton
Furnace, beehive (f.o.b.)	
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

INITIAL PINCH TYPE PLATE BENDING ROLL

Capacity ½" X 8'



Our Line

Light and heavy machinery for all classes of sheet metal, plate and structural work

BERTSCH & COMPANY, CAMBRIDGE CITY • INDIANA

PUZZLED...

about personnel problems

Dissatisfied with present recruiting methods? The IRON AGE Employment Exchange is the meeting place for employers and men qualified in all phases of metalworking. For advertising rates, write to Chestnut and 56th Sts., Philadelphia 39.

FERROALLOY PRICES

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 65-71% Cr, .30-1.00% max. Si.

0.02% C....	41.00	0.50% C....	33.25
0.05% C....	34.00	1.00% C....	33.00
0.10% C....	33.75	1.50% C....	32.75
0.20% C....	33.50	2.00% C....	32.50

3-5% C, 53-63% Cr, 2.5% max. Si... 26.00
4-6% C, 58-63% Cr, 3-6% Si..... 22.50
5-8% C, 58-63% Cr, 3-6% Si..... 22.50
6-8% C, 50-56% Cr, 4-7% Si..... 22.00
4.00-4.50% C, 60-70% Cr, 1.2% Si.. 28.75
0.025% C (Simplex) 35.00
0.010% C max, 63-66% Cr, 5-7% Si. 34.50
0.25% C max 33.50
0.010% C max, 68-71% Cr, 2% Si max 34.50
0.25% C max 33.50

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Chromium Metal

Per lb chromium, contained, packed delivered, ton lots, 97.25% min. Cr, 1% max. Fe.

0.10% max. C $1.29
9 to 11% C, 88-91% Cr, 0.75% Fe... 1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads $1.15
Ton lots 1.17
Less ton lots 1.19

Low Carbon Ferrochrome Silicon

(Cr 39-41%, Si 42-45%, C 0.05% max.) Carloads, delivered, lump, 3-in x down, packed.

Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads, bulk	24.50	14.60
Ton lots	29.75	16.05
Less ton lots	31.35	17.70

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads, bulk 24.00
Ton lots 27.95
Less ton lots 29.45

Calcium-Maganese—Silicon

Cents per lb of alloy, lump, delivered, packed.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads, bulk 23.00
Ton lots 26.15
Less ton lots 27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots 21.15
Less ton lots 22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed max. St. Louis, V-5: 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots 18.45
Ton lots 19.95
Less ton lots 21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload bulk 19.20
Ton lots to carload packed 21.15
Less ton lots 22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn. Carload lots, bulk.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Houston, Tex.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa.	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
Rockwood, Tenn.	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk 13.70
Ton lots packed in bags 16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

	Palmerton, Pa. 10 lb, pig	35 lb, down	Neville Is., Pa. 35 lb
Mn			
16-19% ..	$98.00	$96.00	$100.50
19-21% ..	100.00	98.00	102.50
21-23% ..	102.50	100.00	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed 45.75
Ton lots 47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads, bulk 34.25
Ton lots, palletized 36.25
250 to 1999 lb 39.00
Premium for Hydrogen - removed metal 0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	31.10	33.90	35.10
0.30% max. C	29.80	32.60	33.80
0.50% max. C	28.50	31.30	32.50
0.75% max. C, 80.85% Mn, 5.0-7.0% Si ...	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.

Carloads bulk 11.60
Ton lots, packed 13.25
Carloads, bulk, delivered, per lb of briquet 14.00
Briquets, packed pallets, 2000 lb up to carloads 16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, frieght allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe ..	22.95	21.65
98% Si, 1.0% Fe	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.

Carloads, bulk 8.00
Ton lots, packed 10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si....	14.60	75% Si....	16.90
65% Si....	15.75	85% Si....	18.60
	90% Si....	20.00	

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.

Openhearth 3.20
Crucible 3.30
High speed steel 3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb...	2.40	3.30	4.55

(Effective Jan. 16, 1961)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y. per lb.

Carloads, bulk ..... 9.85¢
Ton lots ..... 11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.50

Ferrocolumbium, 58-62% Cb, 2 in. x D, del'd per lb con't Cb

Ton lots $3.45
Less ton lots 3.50

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta $3.40

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.76

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage, per gross ton $120.00
10 tons to less carload $131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots $1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton $255.00

Ferrotungsten, ¼ x down packed per pounds contained W, ton lots delivered ..... $2.15 (nominal)

Molybdic oxide, briquets per lb. contained Mo, f.o.b. Langeloth, Pa. $1.49
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.

Carload, bulk lump ..... 18.50¢
Ton lots, packed lump ..... 20.50¢
Less ton lots ..... 21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 .... $1.38

Zirconium silicon, per lb of alloy

35-40% del'd, carloads, bulk.. 26.25¢
12-15%, del'd lump, bulk-carloads ..... 9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B

2000 lb carload $5.50

Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound ..... 30¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.

Ton lots per pound ..... 18.25¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots... $1.20
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up

10 to 14% B ..... .85
14 to 19% 1.20
19% min. B 1.50

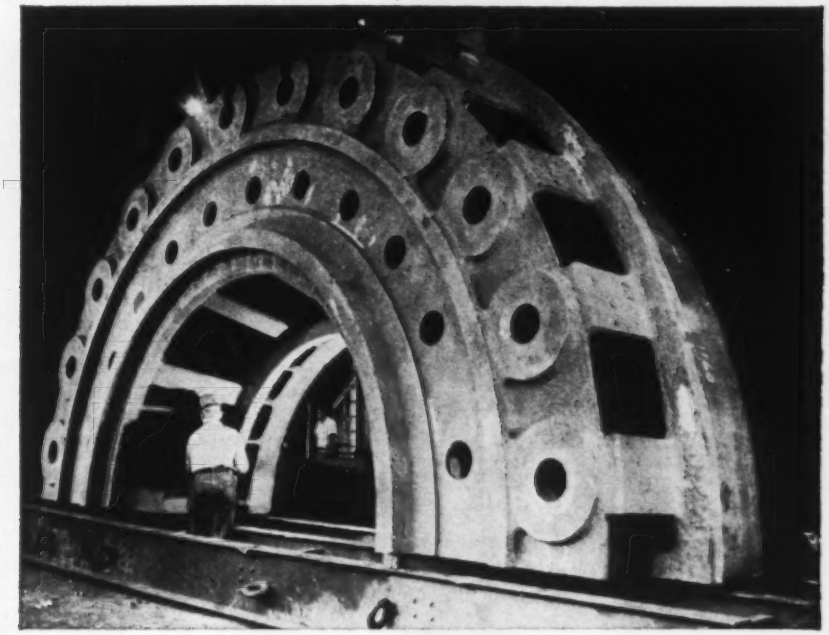
Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb & over

No. 1 ..... $1.05
No. 79 ..... 50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd

Ton lots (packed) $1.46
Less ton lots (packed) 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots 2.15



More Than Meets the Eye in "ELECTRICITY at YOUR FINGER TIPS" . . .

The author of this article is Joseph A. Shuffstall, General Manager of Administrative Services, Erie Forge & Steel Corporation, Erie, Pa.

Before throwing an electric switch, have you ever hesitated to give a fleeting thought to why electricity is your instant servant?

Here's a typical example of what is contributed by industry to make possible the enjoyment of your many electric servants. This 44 ton steel casting, made in the foundries of Erie Forge & Steel Corporation, Erie, Pa., is one of 12 half covers for 6 hydro-electric turbines, each of which will produce 150,000 kilowatts of electric power on the Lewiston Project near Niagara Falls, New York. Altogether, these six 200,000 horse power turbines will furnish 900,000 kilowatts and there are 19 more of smaller horse power on this project alone.

Now think of baking a batch of fluffy biscuits, a light, white loaf of bread, a birthday cake. The same procedures the baker follows are used by the foundrymen who cast these mammoth covers. First, skilled engineers and foundry technicians design and build the correct patterns for moulds, "the cake pans" into which the ingredients are poured, white hot molten steel. Then the ingredients, carefully measured and controlled by the metallurgists, must be exactly right to make sure the casting will do its job perfectly.

To get technical right here, the large 9 foot 6 inch bore core was made integral with the mould by aligning core box with sweep spindle and ramming it on bed of mould. This eliminated the necessity of transporting, handling and setting extremely large cores. A segmental type pattern with a ring type riser on the cope side eliminated the cope portion of the mould. Directional and progressive feeding of the molten metal during the solidification period was made possible by slight design modifications promoting a sound homogeneous structure.

After stripping, the castings were subjected to hydro-blasting and the arc-air method for excavating surface imperfections. Finally, rigid dimensional inspection was followed by magnetic particle and radiographic examination at critical areas.

Here, at Erie Forge & Steel, experienced engineers, metallurgists and craftsmen control quality every step of the way from raw materials to finished steel casting.

This short sketch covers only a small part of industry's contribution to the multitude of machines which, working as a unit, make "electricity at your finger tips" a commonplace and useful reality.

ERIE FORGE & STEEL CORPORATION

ERIE, PENNSYLVANIA

FOR SALE CHEAP

10 TON

OUTSIDE OVERHEAD

CRANE

•

ENCLOSED CAB

SPAN: Center to center of runway rails 75'; SPAN: Center to center of trolley rails 72"; Bottom of A-Frame to top of runway rails 23' 1"; Length of runway rail 289' 8⅞"; Hoist motor drive with 30 HP 3/60/440 V 860 RPM AC motor; Geared motor drive trolley travel with 6.75 HP 3/60/440 volt 1100 RPM AC motor; Geared motor drive to Bridge Travel with 3/60/220/440 V 690 RPM AC motor;
Equipment: Fourteen A Frames and fourteen columns.

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GUARANTEED—RE-NU-BILT

Electric Power Equipment — A. C. Motors

3 phase—60 cycle

SYNCHRONOUS

Qu.	H.P.	Make	Type	Volts	Speed
1	6000	G.E.	ATI .8P.F.	2200/6600	600
1	3500	G.E.	TS 1.0P.F.	4600/2300/4000	360
2	1750	G.E.	ATI	2300	3600
2	500	G.E.	TS 7569	2200	1200
1	400	G.E.	TS 7565	2200	1200
2	350	G.E.	ATI 1.0P.F.	2300	150
1	325	G.E.	ATI 1.0P.F.	440	1800
2	300	ElMach.	BRKT	2200	1200

SLIP RING

1	1750	G.E.	M-5798	4800	1800
1	800	Whse.	CW	500	1776
1	800	G.E.	MT-428	2300	450
1	600	Whse.	CW 4-32-D-15	440	1778
1	550	Whse.	CW	440	252
1	500	Whse.	CW	550	350
1	300	A.C.	ANY	440/2300	720
1	300	G.E.	MTF-561	2200	1800
1	250	G.E.	IM-16	220/440	875
1	250	Cr.Wh.	Size 29Q	2300	350
1	250	G.E.	MT-424Y	4000	257
1	200	G.E.	IE-13B	220	1800
2	200	Whse.	CW-890	2300	1775
1	200	G.E.	IM	2200	580
1	200	G.E.	IM	440	435
3	150	G.E.	IM-17	440	435
1	125	G.E.	MT-557	220/440	1200
1	125	A.C.	ARY	440	870
3	100	A.C.		440	695
1	100	G.E.	M-6335Z	220/440	580
1	100	Whse.	CW-754C	220/440	900

SQUIRREL CAGE

2	1500	G.E.	K	2200	3580
1	500	G.E.	FT-559AY	2200	3600
1	500	Whse.	CS-1115	2300	883/445
4	500	Whse.	CS-1216	2200	500
2	450	Ell.	F-3910	2200	1200
1	400	Whse.	CS-7151-810H	6600/4000	3565
1	300	Cont.	NL-6868	440	1780
1	300	G.E.	KT-559A	2200	1775
1	300	Whse.	CS-1002	2300	580
1	250	Whse.	CS-8758	2200	1775
2	200	Whse.	CS-8558	220/440	1750

BELYEA COMPANY, INC.

47 Howell Street, Jersey City 6, N. J.

Tel. OL 3-3334

Detroit Dealers Start Slowly

Used machinery dealers in Detroit report that the first quarter is starting slowly.

However, they predict a pick-up by the second quarter. Inventories are plump.

■ Detroit used machinery dealers say 1960 sales were about the same as 1959, maybe a little lower. They say profits took a greater dip than gross sales due to closer competition, heavier expenses and the increasing need to rebuild machines for top quality performance.

The fourth quarter was a good sales period, according to some dealers. But things slackened off in mid-December and have been tapering off since.

The outlook for the first quarter of 1961 seems to be about the same as the last few months of 1960. Some are predicting a little pickup in the second quarter. They think this will result from customers entering the market who have been delaying buying because of recession scare talk. Tightened capital appropriations will likely become loose by spring.

Inventories Plump—Availability of second-hand machinery in the Motor City is excellent; inventories plump and varied. Practically every line of tool can be found, with good World War II vintage machines plentiful. If there is a shortage, it is in standard purpose tools built since 1950.

Prices Unchanged—Detroit prices are about the same as a year ago for first class rebuilt tools. "As-Is," or tools which haven't been rebuilt, are a little cheaper than last year.

Detroit dealers are not really on the lookout for any equipment in particular to fill their shops. But some have an eye out for first-rate, late model machines.

Foreign sales are still a great influence on the market. In fact, some companies say overseas buyers are holding Detroit sales up. If it weren't for them, the market would be considerably more inert.

Auction Prices Steady — There are about the same number of auctions today as a year ago. And auction prices are pretty much holding their own.

Asked about the possibility of tool and die shop closedowns hampering business this year, a dealer said: "I don't know what to think. There have been many layoffs recently. Whether these companies will dispose of any equipment is still a mystery. I haven't seen any lists from any big companies recently that want to sell."

"This will do anything!"

REBUILT—GUARANTEED ELECTRICAL EQUIPMENT

SLIP RING MOTORS

3 Phase—60 Cycle

Qu.	H.P.	Make	Type	Volts	R.P.M.
1**	2500	Al.Ch.	ANY	2200	296
1**	1800	Whse.	Mill	2300	252
1**	1300	Whse.	CW	2200	444
1	700	Whse.	CW-1224	2200	600
1**	500	Al.Ch.	ANY	2200	505
1**	500	Al.Ch.	ANY	2200	293
1	400	Whse.	CW	2200	600
1*	400	Al.Ch.	ANY	2200	505
1	400	Whse.	CW	2200	290
1	350	G.E.	IE15-M	2200	1180
3	300	G.E.	IE15B-M	440	1200
1	300	Whse.	CW-1612	2200/440	720
1	250	Whse.	CW	4160/2400	710
1	250	Whse.	CW	2200	600
1	250	Cr.Wh.	Size Q	4600/2300	350
1	250	G.E.	MT-414	2200	300
2	200	G.E.	I-17-M	2200/440	600
1	200	G.E.	I-14-M	2200	490
1	150	G.E.	MT-564	2200/440	700
1	150	Whse.	CW	4160/2200	585

*—Pedestal Bearings
**—Mill type with stator shifting base

SPECIAL—3 Outdoor Air Circuit Breakers, G.E. type ARA, 1200 amps., 14.4-KV, 1000-MVA Int. Capacity.

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atmosphere-controlled with 9 bases, are available. Each is approximately 7' x 7' x 14'. Excellent when used for manufacture of steel coils, they have a capacity of 50 tons per charge. These top-grade furnaces are still set up in the plant. Tremendous values specially priced for prompt sale.

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250# LECTROMELT—185 KVA
500# LECTROMELT—200 KVA
1000# SWINDELL—500 KVA
2000# SWINDELL—1000 KVA
3000# HEROULT, Door Charge
DETROIT FURNACES—10 lb. to 300 lb. Cap.

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75 KW TOCCO M.G. Induction Heater 2 station
20 KW THERMONIC Induction Heater 2 station
20 KW ECCO Induction Heater
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● INDUCTION MELTING FURNACES
20 KW AJAX Spark Gap 17# Melting
30 KW VACUUM Melting, Complete—Like New
100 KW AJAX Melting Installation—Late
200 KW, 960 cycle, 1000# steel
400# & 600# FISHER MNP Gas Fired Melting Furnaces

● HEAT TREAT FURNACES
4'x4'x10' Gas Fired Box 1500°F.
7' G. E. Rotary Hearth Electric, 1900°F.
36" dia. x 36" deep Electric Recirculating
42" wide roller Hearth 50'L w/atmos. gen.
24"x16'Lx36" 210 KW conveyor, 1400°F.
10"x12"x24" LINDBERG 2500°F. hydrogen

● CLEANING EQUIPMENT AND GRINDERS
15x20 WHEELABRATOR
20x27 WHEELABRATOR
27x36 WHEELABRATOR w/loader
36x42 WHEELABRATOR w/loader
48x42 WHEELABRATOR w/loader
48x72 WHEELABRATOR w/loader
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#1A WHEELABRATOR Multi-table
WHEELABRATOR Pipe Cleaning Cabinet to 12" O.D.
6' LG PANGBORN Table
6' LK PANGBORN Table-room

72" WHEELABRATOR SWING TABLE
Capable of handling work 72" in diameter & 40" high, complete w/2 aux. tables, #8 Model 70 dust collector & many Long Life spare parts.
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20,000# Coils 7 Cuts .125 or 20 cuts .025
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Various Sizes
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* * * * * *
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10x18" Norton Type C, m.d., latest
10x36" Cincinnati Hydraulic, model EA, m.d.
10x36" Norton Type C, m.d.
10x36" Landis Type CH Plain, m.d.
10x48" Cincinnati Model ER Plain Hydraulic, m.d.
10x72" Landis Hydraulic, m.d.
14x36" Landis, Type C, Plain
16x36" Cincinnati Plain, m.d.
18x36" Landis Type C, m.d.
18x72" Norton Type C, mechanical, m.d.
20x72" Landis Type DC, m.d., 1944
23x36" cc Norton Type C, m.d.
23x72" cc Type C Norton Semi-auto., hydraulic
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440	Toledo	#59¼ SS SC	41 x 48"	12"	11	—
380	Bliss	SS 4 pt. Susp.	170 x 65"	10"	18	'45
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ADVERTISERS IN THIS ISSUE

An asterisk indicates that a booklet, or other information, is offered in the advertisement.

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A

*Acme Steel Co. ... 27
Air Reduction Sales Co. Div. ... 103
*Aldrich Pump Co. ... 23
*Allen-Bradley Co. ... 57-58
Allis-Chalmers ... 32-33
Alten Foundry & Machine Works, Inc. ... 131

B

*Babcock & Wilcox Co., Refractories Div. ... 62
*Babcock & Wilcox Co., Tubular Products Div. ... 6
Baldt Anchor, Chain & Forge Div. ... 131
Bearings, Inc. ... 4
Belyea Co., Inc. ... 128
Bertsch & Co. ... 125
*Beryllium Corp. ... 36
*Bethlehem Steel Co. ... 1, 17-20
Birdsboro Corp. ... 95
Bullard Co. ... 60

C

C & E Forging Corp. ... 131
Cab Machine Enterprises ... 130
Carco Industries, Inc. ... 130
Carlstrom Pressed Metal Co. ... 131
*Cerand Corp. ... 98
Cincinnati Milling Machine Co. Cincinnati Milling Products Div. ... 72
*Cincinnati Milling Machine Co. Milling Mch. Div. ... 10
*Coffing Hoist Div., Duff-Norton Co. ... 26
Cone-Drive Gears Div., Michigan Tool Co. ... 115
Consumers Steel & Supply Co. ... 131
Cutler-Hammer Inc. ... 28-29
*Cyril Bath Co. ... 44

D

*DeLaval Steam Turbine Co. ... 92
Dixie Bearings, Inc. ... 4
*Duff-Norton Co. Coffing Hoist Div. ... 26

E

Eastern Machinery Co. ... 129
Eastman Kodak Co. X-Ray Div. ... 89
Erie Forge & Steel Corp. ... 127

F

Falk Machinery Co. ... 130
Foster, Frank B. Inc. ... 130
Foster, L. B. Co. ... 129

G

Gardner Machine Co. Inside Front Cover
Gates Rubber Co. ... 68-69
General Electric Co., Apparatus Dept. ... 91
General Steel Castings Corp., National Roll & Foundry Div. ... 110
Gilbert Merrill Steel Corp. ... 131
*Gisholt Machine Co. ... 24
Goss & DeLeeuw Machine Co. ... 132
Greenlee Bros. & Co. ... 64
Greist Manufacturing Co. ... 130

H

Harvey Aluminum, Inc. ... 131
*Hitchiner Mfg. Co., Inc. ... 97
*Horsburgh & Scott Co. ... 109
Hughes, Arnold, Co. ... 129, 131
Hussey, C. G. & Co. ... 12
Hyman, Joseph & Sons ... 129

I

International Business Machines ... 70-71
Interstate Machinery Co. ... 128
Iron & Steel Products, Inc. ... 129

J

Jeffrey Mfg. Co. ... 22

K

*Kardong Brothers, Inc. ... 132
Keystone Forging Company ... 130

L

Lang Machinery Co., Inc. ... 129
*Link-Belt Co. ... 55
*Lord Chemical Corp. ... 16

M

MacCabe, T. B. Co. ... 129
*Manhattan Rubber Div., Raybestos-Manhattan, Inc. ... 104-105
*Meehanite Metal Corp. ... 101
Michigan Tool Co., Cone-Drive Gears Div. ... 115
Mimik Tracers, Inc. ... 90
*Minnesota Mining & Mfg. Co. Abrasives Industrial Tape ... 113
*Mundt, Chas. & Sons ... 132

N

National Machinery Exchange ... 129
National Roll & Foundry Div., General Steel Castings Corp. ... 110
New England Pressed Steel Co. ... 130
Norton Co., Abrasive Grain Div. ... 66

P

*Pangborn Corp. ... Inside Back Cover
*Powermatic Mch. Co. ... 37

R

*Raybestos-Manhattan, Inc. Manhattan Rubber Div. ... 104-105
*Republic Steel Corp. ... 30-31
*Research-Cottrell, Inc. ... 40
*Roberts, C. A., Co. ... 103
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp. ... 99
Rosedale Foundry & Machine Co. ... 130

S

Sandvik Steel, Inc. ... 74
Saxony Press ... 131
*Screw & Bolt Corp. of America ... 8
*Selas Corp. of America ... 34-35
*Shepard Niles Crane & Hoist Corp. ... 100
Smith, Thomas Co. ... 131
Southern Screw Co. ... 21

T

*Taylor Fibre Co. ... 108
*Thomas Machine Manufacturing Co. ... 106
Timken Roller Bearing Co. Back Cover
Tractor & Equipment Co. ... 129

U

*Union Carbide Metals Co. Div. Union Carbide Corp. ... 42
Universal Machinery & Equipment Co. ... 129
Universal Metal Products Corp. ... 130

W

Wallack Bros. ... 131
Ward Steel Co. ... 106
Weatherly Foundry & Mfg. Co. ... 131
Weiss, B. M. Co. ... 130
Weiss Steel Co., Inc. ... 131
Wender Presses, Inc. ... 130
*White, S. S., Industrial Div. ... 25
*Whiting Corp. ... 14
*Williams, J. H. & Co. ... 41

Y

*Yale & Towne Manufacturing Co. ... 38-39
*Yoder Co. ... 97
Youngstown Foundry & Machine Co. ... 107

CLASSIFIED SECTION

Clearing House ... 128-130
Contract Manufacturing ... 130-131
Employment Exchange ... 131
Equipment & Materials Wanted ... 131

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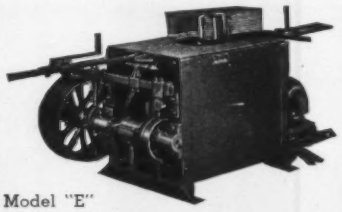

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